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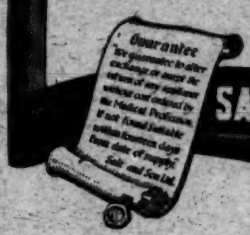

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BRITISH MEDICAL JOURNAL

LONDON SATURDAY DECEMBER 10 1949

CAN A SCIENTIFIC SOCIETY BE STABLE?*

BY

BERTRAND RUSSELL, O.M., F.R.S.

I will begin with some explanation of the question with which I am concerned. I call a society "scientific" in the degree to which scientific knowledge, and technique based upon that knowledge, affects its daily life, its economics, and its political organization. This, of course, is a matter of degree. Science in its early stages had few social effects except upon the small number of learned men who took an interest in it, but in recent times it has been transforming ordinary life with ever-increasing velocity.

I am using the word "stable" as it is used in physics. A top is "stable" so long as it rotates with more than a certain speed; then it becomes unstable and the top falls over. An atom which is not radioactive is "stable" until a nuclear physicist gets hold of it. A star is "stable" for millions of years, and then one day it explodes. It is in this sense that I wish to ask whether the kind of society that we are creating is "stable."

I want to emphasize that the question I am asking is purely factual. I am not considering whether it is better to be stable or to be unstable; that is a question of values, and lies outside the scope of scientific discussion. I am asking whether, in fact, it is probable or improbable that society will persist in being scientific. If it does, it must almost inevitably grow progressively more and more scientific, since new knowledge will accumulate. If it does not, there may be either a gradual decay, like the cooling of the sun by radiation, or a violent transformation, like those that cause novae to appear in the heavens. The former would show itself in exhaustion, the latter in revolution or unsuccessful war.

The problem is extremely speculative, as appears when we consider the time scale. Astronomers tell us that in all likelihood the earth will remain habitable for very many millions of years. Man has existed for about a million years. Therefore if all goes well his future should be immeasurably longer than his past.

Science, as pure knowledge, began about 2,500 years ago, but as a force affecting daily life it began much later—with gunpowder and the mariner's compass. It did not begin to be a really powerful cause of social change until the industrial revolution, 150 years ago. To predict on the basis of such a very brief experience is evidently hazardous. All that can be done is to pick out certain aspects of the question with a view to causing awareness of dangers and possibilities.

Broadly speaking, we are in the middle of a race between human skill as to means and human folly as to ends. Given sufficient folly as to ends, every increase in the skill required to achieve them is to the bad. The human race has survived hitherto owing to ignorance and incompetence; but, given knowledge and competence combined with folly, there can be no certainty of survival. Knowledge is power, but it is power for evil just as much as for good. It follows that, unless men increase in wisdom as much as in knowledge, increase of knowledge will be increase of sorrow.

*The Lloyd Roberts Lecture given at the Royal Society of Medicine, London, on November 29, 1949.

Causes of Instability

Possible causes of instability may be grouped under three heads: physical, biological, and psychological. I will begin with the physical causes.

Physical

Both industry and agriculture, to a continually increasing degree, are carried on in ways that waste the world's capital of natural resources. In agriculture this has always been the case since man first tilled the soil, except in places like the Nile Valley, where there were very exceptional conditions. While population was sparse, people merely moved on when their former fields became unsatisfactory. Then it was found that corpses could be used as fertilizers, and human sacrifice became common. This had the double advantage of increasing the yield and diminishing the number of mouths to be fed; nevertheless the method came to be frowned upon, and its place was taken by war. Wars, however, were not sufficiently destructive of human life to prevent the survivors from suffering, and the exhaustion of the soil has continued at a constantly increasing rate right down to our own day. At last the creation of the Dust Bowl in the United States compelled attention to the problem. It is now known what must be done if the world's supply of food is not to diminish catastrophically. But whether what is necessary will be done is a very doubtful question. The demand for food is so insistent, and the immediate profit so great, that only a strong and intelligent government can enforce the required measures; and in many parts of the world governments are not both strong and intelligent. I am for the present ignoring the population problem, which I shall consider presently.

Raw materials, in the long run, present just as grave a problem as agriculture. Cornwall produced tin from Phoenician times until very lately; now the tin of Cornwall is exhausted. Light-heartedly, the world contents itself with observing that there is tin in Malaya, forgetting that that too will be used up presently. Sooner or later all easily accessible tin will have been used up, and the same is true of most raw materials. The most pressing, at the moment, is oil. Without oil a nation cannot, with our

present techniques, prosper industrially or defend itself in war. The supply is being rapidly depleted, and will be used up even more swiftly in the wars that are to be expected for possession of such supplies as will remain. Of course I shall be told that atomic energy will replace oil as a source of power. But what will happen when all the available uranium and thorium have done their work of killing men and fishes?

The indisputable fact is that industry—and agriculture in so far as it uses artificial fertilizers—depends upon irreplaceable materials and sources of energy. No doubt science will discover new sources as the need arises, but this will involve a gradual decrease in the yield of a given amount of land and labour, and in any case is an essentially temporary expedient. The world has been living on capital, and so long as it remains industrial it must continue to do so. This is one inescapable though perhaps rather distant source of instability in a scientific society.

BIOLOGICAL

I come now to the biological aspects of our question. If we estimate the biological success of a species by its numbers it must be admitted that Man has been most remarkably successful. In his early days Man must have been a very rare species. His two great advantages—the capacity of using his hands to manipulate tools, and the power of transmitting experience and invention by means of language—are slowly cumulative: at first there were few tools and there was little knowledge to transmit; moreover, no one knows at what stage language developed. However that may be, there were three great advances by means of which the human population of the globe was increased. The first was the taming of the animals that became domestic; the second was the adoption of agriculture; and the third was the industrial revolution. By means of these three advances men have become enormously more numerous than any species of large wild mammal. Sheep and cattle owe their large numbers to human care; as competitors with man large mammals have no chance, as appears from the virtual extinction of the buffalo.

In addressing a medical audience, it is with trepidation that I advance my next thesis, which is this. Medicine cannot, except over a short period, increase the population of the world. No doubt if medicine in the fourteenth century had known how to combat the Black Death the population of Europe in the latter half of the fourteenth century would have been larger than it was. But the deficiency was soon made up to its Malthusian level by natural increase. In China, European and American medical missions do much to diminish the infant death rate; the consequence is that more children die painfully of famine at the age of five or six. The benefit to mankind is very questionable. Except where the birth-rate is low the population in the long run depends upon the food supply and upon nothing else. In the Western world the fall in the birth rate has for the time being falsified Malthus's doctrine. But until lately this doctrine was true throughout the world, and it is still true in the densely populated countries of the East.

What has science done to increase population? In the first place, by machinery, fertilizers, and improved breeds it has increased the yield per acre and the yield per man-hour of labour. This is a direct effect. But there is another which is perhaps more important, at least for the moment. By improvement in means of transport it has become possible for one region to produce an excess of food while another produces an excess of industrial products or raw materials. This makes it possible—as for instance in our own country—for a region to contain a larger population than its own food resources could support. Assuming free mobility of persons and goods, it is only necessary that the whole world should produce enough food for the population of the whole world, provided the regions of deficient food production have something to offer which the regions of surplus food production are willing to accept in exchange for food. But this condition is apt to fail in bad times. In Russia, after the first world war, the peasants had just about the amount of food they wanted for themselves, and would not willingly part with any of it for the purchase of urban products. At that time, and again during the famine in the early '30s, the urban population was kept alive only by the energetic use of armed force. In the famine, as a result of government action, millions of peasants died of starvation; if the government had been neutral the town-dwellers would have died.

Such considerations point to a conclusion which, it seems to me, is too often ignored. Industry, except in so far as it ministers directly to the needs of agriculture, is a luxury: in bad times its products will be unsaleable, and only force directed against food-producers can keep industrial workers alive, and that only if very many food-producers are left to die. If bad times become common, it must be inferred that industry will dwindle and that the industrialization characteristic of the last 150 years will be rudely checked.

But bad times, you may say, are exceptional, and can be dealt with by exceptional methods. This has been more or less true during the honeymoon period of industrialism, but it will not remain true unless the increase of population can be enormously diminished. At present the population of the world is increasing at about 58,000 per diem, or about 20 millions per annum. War, so far, has had no very great effect on this increase, which continued throughout each of the world wars. Until the last quarter of the nineteenth century this increase was more rapid in advanced countries than in backward ones, but now it is almost wholly confined to very poor countries. Of these, China and India are numerically the most important, while Russia is the most important in world politics. But I want, for the present, to confine myself, so far as I can, to biological considerations, leaving world politics on one side.

What is the inevitable result if the increase of population is not checked? There must be a very general lowering of the standard of life in what are now prosperous countries. With that lowering there must go a great diminution in the demand for industrial products. Detroit will have to give up making private cars, and confine itself to lorries. Such things as books, pianos, watches will become the rare luxuries of a few exceptionally powerful men—notably those who control the army and the police. In the end there will be a uniformity of misery, and the Malthusian law will reign unchecked. The world having been technically unified, population will increase when world harvests are good, and diminish by starvation whenever they are bad. Most of the present urban and industrial centres will have become derelict, and their inhabitants, if still alive, will have reverted to the peasant hardships of their mediaeval ancestors. The world will have achieved a new stability, but at the cost of everything that gives value to human life.

Are mere numbers so important that, for their sake, we should patiently permit such a state of affairs to come about? Surely not. What, then, can we do? Apart from certain deep-seated prejudices, the answer would be obvious. The nations which at present increase rapidly should be encouraged to adopt the methods by which, in the West, the increase of population has been checked

Educational propaganda, with government help, could achieve this result in a generation. There are, however, two powerful forces opposed to such a policy: one is religion, the other is nationalism. I think it is the duty of all who are capable of facing facts to realize, and to proclaim, that opposition to the spread of birth control, if successful, must inflict upon mankind the most appalling depth of misery and degradation, and that within another fifty years or so.

I do not pretend that birth control is the only way in which population can be kept from increasing. There are others, which, one must suppose, opponents of birth control would prefer. War, as I remarked a moment ago, has hitherto been disappointing in this respect, but perhaps bacteriological war may prove more effective. If a Black Death could be spread throughout the world once in every generation survivors could procreate freely without making the world too full. There would be nothing in this to offend the consciences of the devout or to restrain the ambitions of nationalists. The state of affairs might be somewhat unpleasant, but what of that? Really high-minded people are indifferent to happiness, especially other people's. However, I am wandering from the question of stability, to which I must return.

There are three ways of securing a society that shall be stable as regards population. The first is that of birth control, the second that of infanticide or really destructive wars, and the third that of general misery except for a powerful minority. All these methods have been practised: the first, for example, by the Australian aborigines; the second by the Aztecs, the Spartans, and the rulers of Plato's Republic; the third in the world as some Western internationalists hope to make it and in Soviet Russia. (It is not to be supposed that Indians and Chinese like starving, but they have to endure it because the armaments of the West are too strong for them.) Of these three, only birth control avoids extreme cruelty and unhappiness for the majority of human beings. Meanwhile, so long as there is not a single world government there will be competition for power among the different nations. And as increase of population brings the threat of famine national power will become more and more obviously the only way of avoiding starvation. There will therefore be blocs in which the hungry nations band together against those that are well fed. That is the explanation of the victory of communism in China.

These considerations prove that a scientific world society cannot be stable unless there is a world government.

It may be said, however, that this is a hasty conclusion. All that follows directly from what has been said is that, unless there is a world government which secures universal birth control, there must from time to time be great wars, in which the penalty of defeat is widespread death by starvation. That is exactly the present state of the world, and some may hold that there is no reason why it should not continue for centuries. I do not myself believe that this is possible. The two great wars that we have experienced have lowered the level of civilization in many parts of the world, and the next is pretty sure to achieve much more in this direction. Unless, at some stage, one power or group of powers emerges victorious and proceeds to establish a single government of the world with a monopoly of armed force, it is clear that the level of civilization must continually decline until scientific warfare becomes impossible—that is, until science is extinct. Reduced once more to bows and arrows, *Homo sapiens* might breathe again, and climb anew the dreary road to a similar futile culmination.

The need for a world government, if the population problem is to be solved in any humane manner, is completely evident on Darwinian principles. Given two groups, of which one has an increasing and the other a stationary population, the one with the increasing population will (other things being equal) in time become the stronger. After victory, it will cut down the food supply of the vanquished, of whom many will die.* Therefore there will be a continually renewed victory of those nations that, from a world point of view, are unduly prolific. This is merely the modern form of the old struggle for existence. And given scientific powers of destruction, a world which allows this struggle to continue cannot be stable.

PSYCHOLOGICAL

The psychological conditions of stability in a scientific society are to my mind quite as important as the physical and biological conditions, but they are much more difficult to discuss, because psychology is a less advanced science than either physics or biology. Nevertheless, let us make the attempt.

The old rationalist psychology used to assume that if you showed a man quite clearly that a certain course of action would lead to disaster for himself he would probably avoid it. They also took for granted a will to live, except in a negligible minority. Chiefly as a result of psycho-analysis this Benthamite belief that most men pursue their own interest in a more or less reasonable way has not now the hold on informed opinion that it formerly had. But not very many people, among those concerned with politics, have applied modern psychology to the explanation of large-scale social phenomena. This is what I propose, with much diffidence, to attempt.

Consider, as the most important illustration, the present drift towards a third world war. You are arguing, let us say, with an ordinary cheerful non-political and legally sane person. You point out to him what can be done by atom bombs, what Russian occupation of Western Europe would mean in suffering and destruction of culture, what poverty and what regimentation would result even in the event of a fairly quick victory. All this he fully admits, but nevertheless you do not achieve the result for which you had hoped. You make his flesh creep, but he rather enjoys the sensation. You point out the disorganization to be expected, and he thinks: "Well, anyhow, I shan't have to go to the office every morning." You expatiate on the large number of civilian deaths that will take place, and while, in the top layer of his mind, he is duly horrified, there is a whisper in a deeper layer: "Perhaps I shall become a widower, and that might be not so bad." And so, to your disgust, he takes refuge in archaic heroism, and exclaims:

> "Blow wind! come wrack!
> At least we'll die with harness on our back,"

or whatever more prosaic equivalent he may prefer.

Psychologically, there are two opposite maladies which have become so common as to be dominant factors in politics. One is rage, the other listlessness. The typical example of the former was the mentality of the Nazis; of the latter, the mentality in France which weakened resistance to Germany before and during the war. In less acute forms these two maladies exist in other countries, and are,

*Some may think this statement unduly brutal. But if they will look up newspapers of three or four years ago they will find, side by side, indignant letters saying that British labour could not be efficient on a diet of 2,500 calories, and that it was preposterous to suppose that a German needed more than 1,200 calories.

I think, intimately bound up with the regimentation which is associated with industrialism. Rage causes nations to embark on enterprises that are practically certain to be injurious to themselves; listlessness causes other nations to be careless in warding off evils, and generally disinclined to undertake anything arduous. Both are the outcome of a deep malaise resulting from lack of harmony between disposition and mode of life.

One cause of this malaise is the rapidity of change in material conditions. Savages suddenly subjected to European restraints not infrequently die from inability to endure a life so different from what they have been accustomed to. When I was in Japan in 1921 I seemed to sense in the people with whom I talked, and in the faces of the people I met in the streets, a great nervous strain, of the sort likely to promote hysteria. I thought this came from the fact that deep-rooted unconscious expectations were adapted to old Japan, whereas the whole conscious life of town-dwellers was devoted to an effort to become as like Americans as possible. Such a maladjustment between the conscious and the unconscious was bound to produce discouragement or fury, according as the person concerned was less or more energetic. The same sort of thing happens wherever there is rapid industrialization; it must have happened with considerable intensity in Russia.

But even in a country like our own, where industrialism is old, changes occur with a rapidity which is psychologically difficult. Consider what has happened during my lifetime. When I was a child telephones were new and very rare. During my first visit to America I did not see a single motor-car. I was 39 when I first saw an aeroplane. Broadcasting and the cinema have made the life of the young profoundly different from what it was during my own youth. As for public life, when I first became politically conscious Gladstone and Disraeli still confronted each other amid Victorian solidities, the British Empire seemed eternal, a threat to British naval supremacy was unthinkable, the country was aristocratic and rich and growing richer, and Socialism was regarded as the fad of a few disgruntled and disreputable foreigners.

For an old man, with such a background, it is difficult to feel at home in a world of atomic bombs, communism, and American supremacy. Experience, formerly a help in the acquisition of political sagacity, is now a positive hindrance, because it was acquired in such different conditions. It is now scarcely possible for a man to acquire slowly the sort of wisdom which in former times caused "elders" to be respected, because the lessons of experience become out of date as fast as they are learnt. Science, while it has enormously accelerated outward change, has not yet found any way of hastening psychological change, especially where the unconscious and subconscious are concerned. Few men's unconscious feels at home except in conditions very similar to those which prevailed when they were children.

Rapidity of change, however, is only one of the causes of psychological discontent. Another, perhaps more potent, is the increasing subordination of individuals to organizations, which, so far, has seemed to be an unavoidable feature of a scientific society. In a factory containing expensive plant, and depending upon the closely co-ordinated labour of many people, individual impulses must be completely controlled except by the men constituting the management. There is no possibility, in working hours, of either adventure or idleness. And even outside working hours the opportunities are few for most people. Getting from home to work and from work to home takes time; at the end of the day there is neither time nor money for anything very exciting. And what is true of workers in a factory is true, in a greater or less degree, of most people in a well-organized modern community. Most people, when they are no longer quite young, find themselves in a groove—like the man in the limerick, "not a bus, not a bus, but a tram." Energetic people become rebellious, quiet people become apathetic. War, if it comes, offers an escape. I should like a Gallup poll on the question: "Are you more or less happy now than during the war?" This question should be addressed to both men and women. I think it would be found that a very considerable percentage are less happy now than then.

This state of affairs presents a psychological problem which is too little considered by statesmen. It is hopeless to construct schemes for preserving peace if most people would rather not preserve it. As they do not admit, and perhaps do not know, that they would prefer war, their unconscious will lead them to prefer specious schemes that are not likely to achieve their ostensible purpose.

The difficulty of the problem arises from the highly organic character of modern communities, which makes each dependent upon all to a far greater degree than in pre-industrial times. This makes it necessary to restrain impulse more than was formerly necessary. But restraint of impulse, beyond a point, is very dangerous: it causes destructiveness, cruelty, and anarchic rebellion. Therefore, if populations are not to rise up in a fury and destroy their own creations ways must be found of giving more scope for individuality than exists for most people in the modern world. A society is not stable unless it is on the whole satisfactory to the holders of power and the holders of power are not exposed to the risk of successful revolution. But it is also not stable if the holders of power embark upon rash adventures, such as those of the Kaiser and Hitler. These are the Scylla and Charybdis of the psychological problem, and to steer between them is not easy. Adventure, yes; but not adventure inspired by destructive passions.

Conclusions

Let us now bring together the conclusions which result from our inquiry into the various kinds of conditions that a scientific society must fulfil if it is to be stable.

First, as regards physical conditions. Soil and raw materials must not be used up so fast that scientific progress cannot continually make good the loss by means of new inventions and discoveries. Scientific progress is therefore a condition, not merely of social progress, but even of maintaining the degree of prosperity already achieved. Given a stationary technique, the raw materials that it requires will be used up in no very long time. If raw materials are not to be used up too fast, there must not be free competition for their acquisition and use but an international authority to ration them in such quantities as may from time to time seem compatible with continued industrial prosperity. And similar considerations apply to soil conservation.

Second, as regards population. If there is not to be a permanent and increasing shortage of food, agriculture must be conducted by methods which are not wasteful of soil, and increase of population must not outrun the increase in food production rendered possible by technical improvements. At present neither condition is fulfilled. The population of the world is increasing, and its capacity for food production is diminishing. Such a state of affairs obviously cannot continue very long without producing a cataclysm.

To deal with this problem it will be necessary to find ways of preventing an increase in world population. It

this is to be done otherwise than by wars, pestilences, and famines, it will demand a powerful international authority. This authority should deal out the world's food to the various nations in proportion to their population at the time of the establishment of the authority. If any nation subsequently increased its population it should not on that account receive any more food. The motive for not increasing population would therefore be very compelling. What method of preventing an increase might be preferred should be left to each state to decide.

But although this is the logical solution of the problem, it is obviously at present totally impracticable. It is quite hard enough to create a strong international authority, and it will become impossible if it is to have such unpopular duties. There are, in fact, two opposite difficulties. If at the present moment the world's food were rationed evenly the Western nations would suffer what to them would seem starvation. But, on the other hand, the poorer nations are those whose population increases fastest, and who would suffer most from an allocation which was to remain constant. Therefore, as things stand, all the world would oppose the logical solution.

Taking a long view, however, it is by no means impossible that the population problem will in time solve itself. Prosperous industrial countries have low birth rates; Western nations barely maintain their numbers. If the East were to become as prosperous and as industrial as the West, the increase of population might become sufficiently slow to present no insoluble problem. At present Russia, China, and India are the three great reservoirs of procreation and poverty. If those countries reached the level of diffused well-being now existing in America their surplus population might cease to be a menace to the world.

In general terms, we may say that so far as the population problem is concerned a scientific society could be stable if all the world were as prosperous as America is now. The difficulty, however, is to reach this economic paradise without a previous success in limiting population. It cannot be done as things are now without an appalling upheaval. Only government propaganda on a large scale could quickly change the biological habits of Asia. But Eastern governments would never consent to this except after defeat in war. And without such a change of biological habits Asia cannot become prosperous except by defeating the Western nations, exterminating a large part of their population, and opening the territories now occupied by them to Asiatic immigration. For the Western nations this is not an attractive prospect, but it is not impossible that it may happen. Irrational passions and convictions are so deeply involved in the problem that only an infinitesimal minority, even among highly educated people, are willing even to attempt to consider it rationally. That is the main reason for a gloomy prognosis.

Coming, finally, to the psychological conditions of stability, we find again that a high level of economic prosperity is essential. This would make it possible to give long holidays with full pay. In the days before currency restrictions dons and public schoolmasters used to make their lives endurable by risking death in the Alps. Given secure peace, a not excessive population, and a scientific technique of production, there is no reason why such pleasures should not be open to everybody. There will be need also of devolution, of a great extension of federal forms of government, and of keeping alive the kind of semi-independence that now exists in English universities. But I will not develop this theme, as I have dealt with it in my Reith lectures on "Authority and the Individual."

My conclusion is that a scientific society can be stable given certain conditions. The first of these is a single government of the whole world, possessing a monopoly of armed force and therefore able to enforce peace. The second condition is a general diffusion of prosperity, so that there is no occasion for envy of one part of the world by another. The third condition (which supposes the second fulfilled) is a low birth rate everywhere, so that the population of the world becomes stationary, or nearly so. The fourth condition is the provision for individual initiative both in work and play, and the greatest diffusion of power compatible with maintaining the necessary political and economic framework.

The world is a long way from realizing these conditions, and therefore we must expect vast upheavals and appalling suffering before stability is attained. But, while upheavals and suffering have hitherto been the lot of man, we can now see, however dimly and uncertainly, a possible future culmination in which poverty and war will have been overcome, and fear, where it survives, will have become pathological. The road, I fear, is long, but that is no reason for losing sight of the ultimate hope.

VISCERAL ACTINOMYCOSIS*

BY

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The subject I have chosen has never previously been discussed in any lecture in the series, yet for a reason which I shall give I think it would have been of special interest to Dr. Bradshaw. Dr. William Wood Bradshaw became a Fellow of this College in 1854. For many years he was in practice at Andover and Reading, and he was at one time vice-president of the Reading Pathological Society. He died in 1866, and his widow, Mrs. Sally Bradshaw, by a will dated September 6, 1875, left money to found a lectureship whereby the memory of her husband might be perpetually honoured. This will was proved on August 26, 1880.

Between these two dates something interesting had happened: actinomyces had been discovered and the disease "actinomycosis" named. The discovery was made by Bollinger in 1876, and the name was coined by his friend Harz. Now Dr. Bradshaw did not publish many clinical articles, but if you turn to the *Lancet* for 1846 you will find that he gave a remarkable account of a case of abdominal abscess. The description was of a slowly developing hard mass in the right iliac fossa culminating after two years in an abscess, which discharged pus. The patient improved under treatment by potassium iodide, but his condition relapsed and the right thigh became permanently flexed. The patient's general state deteriorated and there was a fatal issue. From the account given there can be little doubt that this was a case of actinomycosis, which, at the time when Dr. Bradshaw's article was published, was unknown. The first case to be noted in man was by Ponfick in 1879, so that by the time Mrs. Bradshaw's will had been proved actinomycosis had been added

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to the list of diseases affecting human beings. An excellent clinical account of the disease was published by Israël in 1886.

For many years our knowledge of the actinomyces which causes disease in man and animals remained insecure, but a series of careful observers—Wolff (1891), Homer Wright (1905), Naeslund (1931), Colebrook (1920), and others—established certain facts which even now are not sufficiently known. Actinomycetes are very common, and are frequently found in the soil. Most of them are aerobic organisms which seldom cause pathological lesions in man. Occasionally the *Actinomyces asteroides* may affect the lungs. The only actinomyces which commonly gives rise to disease in man is the *Actinomyces bovis* or *Actinomyces israeli*, which will grow only when oxygen is excluded or present in minimal amount. This common pathological agent, which is responsible for nearly all the lesions in man, has never been found outside an animal body. It has never been found on grasses or grains, on hay or on straw, and the farmhand is not more likely to become infected than the city clerk. In man it often lies latent in the carious crevices of teeth or in the deep crypts of the tonsil. It is relatively as common in the peer as in the peasant, but, strangely enough, is more common in men than in women.

That the organism which is so frequently present in the body does not more often cause disease is due to the fact that it finds difficulty in penetrating normal epithelial surfaces; when by accident, by disease, or by necessary operation the epithelial surface is broken the actinomyces may escape into the cellular tissues and begin to grow, well away from the surface. The extraction of a tooth or the perforation of the appendix will be sufficient to allow its escape. Exceptionally, the tissue reaction is acute and may form an abscess in which the fungus is found plentifully but not in granules. More commonly the reaction leads to the formation of a mass of hard fibrous tissue, almost avascular, and on section looking very much like a sarcoma or a scirrhous carcinoma; embedded in this may sometimes be seen small abscesses, but in many cases it needs very careful microscopical examination to find any trace of the organism. Sooner or later softening occurs and an abscess is formed. The inflammation spreads by continuity and often follows the line of least resistance; it has little respect for any tissue, always excepting surface epithelium and dense fascia such as the dura mater.

Some Problems

The dense fibrous reaction of the undifferentiated mesenchyme cells, its chronicity, and its avascularity give rise to some problems and furnish material for reflection. How is it that such minute portions of the actinomyces can form such a mass of tissue, which is sometimes almost like cartilage? There must be some powerful irritant or stimulator. Whence does it come? Twenty-five years ago Carrel taught us that fibroblasts were maintained in a true state of cultivation only by embryonic tissue juice or extracts of some adult tissues or of leucocytes. But the only element which is peculiar to the actinomycotic reaction is the actinomyces, and it is difficult to escape the conclusion that the stimulator of the mesenchyme cells comes from some degenerative or secretory product of the organism itself. We now know that several of the fungi can produce substances of immense power—witness actinomycin, streptomycin, and penicillin—and it seems reasonable to assume that the extraordinary stimulus of fibrous-tissue formation comes from the actinomyces. There is an interesting sidelight on this view. Clinically, we know that treatment by *x* rays may cause a softening of this hard fibrous tissue, and when we recall the statement of Carrel that the substances which he found promoted the growth of fibroblasts were sensitive to *x* rays and to radium we may be right in concluding that the softening process may be the consequence of the destruction of the stimulating substance.

Another problem: How is it that the actinomyces can remain latent in the tissues for months or years? In the first place, being microaerophilic, it can maintain its existence in avascular tissue. Then there is little doubt that the arrangement of the small foci of the fungus in the tissues—growing hyphae surrounded by a palisade of clubs—is beneficial. Thirdly, the conglomeration of the fungus into granules gives added protection. Some recent very interesting work of Per Holm (1948) supports this view. He found that suspensions of pathological actinomyces were as sensitive to penicillin as staphylococci, but it required much more penicillin to destroy the organism when it was collected into the colony usually known as the "sulphur granule." There was one type of fungus which formed less firm and more diffluent granules, which were found to be very sensitive to penicillin. Roberts, Tubbs, and Bates in 1945 published an account of a case which was extremely sensitive to penicillin, and in that case they noted that the granules were very viscous and web-like rather than in a compact mass. So the firm "sulphur granule" seems to have a protective function on the contained fungus

Source of Actinomycotic Infection

Whence comes the actinomycotic infection? We must put aside the traditional and popular fairy-tale about infection from grass or straw, while admitting that many text-books are still doing their best for the older and fallacious teaching. Are we to consider it likely that infection comes from contact with the cow or from infected milk? There is very little, in fact negligible, evidence of this. The disease is so rare in animals other than the cow that we need not consider this source. We have only one possibility left—infection from one human being to another.

Apart from one striking case in which infection probably took place by the contact of kissing, there is no evidence for direct contagion. We are forced to the conclusion that infection with actinomycosis takes place by indirect means. Professor Wilkinson has told me of one case in which infection came from another patient in the same ward who happened to be the victim of the disease; but, ordinarily, infection may come not from a diseased person but from a carrier. The organism often exists in the crevices of carious teeth, and it needs little imagination to see how many opportunities there are for the organism to pass from one person to another. The carious tooth is the usual place from which the trouble springs. Let us now follow the actinomyces in its journey to one or other part of the body from its favourite haunt in the mouth.

As one would expect, more than a half of all the cases occur in the immediate vicinity of the jaw—in the jaw itself, the cheek, the submaxillary and submental regions, and the neck. To emphasize the connexion between infection and the carious tooth I would mention the case of a young woman whom I treated 30 years ago for a large cyst of the lower jaw which gave eggshell crackling; the fang of a carious tooth was in the roof of the cyst, which was filled completely by actinomycotic pus.

When once the fungus has obtained lodgment in the mouth it is inevitable that from time to time portions will

be swallowed and pass through the alimentary canal. In most cases no harm results, but in areas where it may meet an ulcerated surface, or when inflammatory processes give it an opportunity to extend, it may cause serious trouble. It may form a granuloma in the wall of the stomach, and several cases have been recorded in which partial gastrectomy has been performed under the impression that the condition was a cancer. A number of cases of infection of the peritoneum or of adjacent viscera have followed the perforation of a gastric or duodenal ulcer. One case has been recorded in which on microscopical examination the organism was seen at the site of a perforation. When once it has reached the peritoneal cavity it may cause a subphrenic abscess or may even gravitate to the pelvis and form a tumour there. The intestinal contents pass quickly along the small bowel, and it is very rare for the actinomyces to cause any lesion there, though a remarkable instance has been recorded by Sir Gordon Gordon-Taylor (1930).

The vermiform appendix, however, provides a comfortable home and at the same time offers a chance of its escape, so that perforative appendicitis is by far the commonest precursor to abdominal actinomycosis. In a number of recorded cases the perforation of the appendix has communicated direct with sinuses in the inflammatory mass. When once the process has started, the lesion may extend by contiguity downward into the pelvis, backward into the psoas muscle, upwards towards the kidney, and medialwards to the vertebral column. Even the liver may be directly attacked. The best demonstration of this remarkable method of spread is seen in the case which was under the care of Sir Heneage Ogilvie (1940); in this case, when a sinus in the right iliac region was injected with an opaque solution and was radiographed there resulted a picture showing that the sinus communicated direct with tracks which ramified in the liver, traversed the diaphragm, and were directly connected with the bronchioles in the right lung.

The colon and rectum are not so commonly affected, but quite often enough to make it necessary always to consider this disease as a possibility in discussing the diagnosis; in nearly every case there develops an abdominal or pelvic tumour which usually simulates a malignant growth, and in several cases has been excised with that pre-operative diagnosis.

Thoracic infections are also due to spread from the mouth. This may result in several ways. A rare accident, but one which befell a former distinguished member of the Court of Examiners of this College, is the accidental falling of an extracted carious tooth into one of the bronchi; in the case referred to, an actinomycotic abscess formed in the lung round the tooth, and this needed open drainage for its cure. More often minute portions of the fungus are aspirated into the bronchial tree, where they may persist sometimes in a bronchiectatic cavity or in some small inflammatory focus. This view has received remarkable confirmation lately. Two years ago E. B. Kay published some rather illuminating facts giving the results of his investigation of 240 consecutive patients treated for broncho-pulmonary infections. He bronchoscoped them all and took cultures of the sputum and of the bronchial secretions. In 65 of these cases, which included examples of pneumonitis, lung abscess, bronchiectasis, aspiration pneumonia, suppuration distal to a bronchial carcinoma, and simple bronchitis, he was able to isolate and to culture the *Act. israeli.*

The wonder is that pulmonary actinomycosis is comparatively rare, for the microbe is so often there merely awaiting the chance to invade the tissues. In any case, we have a simple explanation of the disease which starts in the lung tissue. But when it starts in the mediastinum, as it often does, we must seek another route of infection, and most likely this is by the escape of the organism through the oesophageal wall. We cannot watch this process, and, as in the cheek, the organism leaves little or no trace of the route by which it escaped, but clinically this method of infection fits in best with the facts; frequently an empyema is the next stage, and then the lung may became involved. It is the rule for pulmonary actinomycosis to invade the thoracic wall and come to the surface. The thorax sometimes becomes infected by the bursting of a hepatic abscess through the diaphragm, or it may become involved by a low cervical infection descending into the superior mediastinum.

The cranial cavity may be affected by infection spreading up from the face through the basal foramina, or the brain may be infected via the blood stream. There is in addition a very remarkable single lesion which has occasionally formed in the region of the septum lucidum or third ventricle; this consists of a filbert-sized actinomycoma which occurs without any other trace of similar infection discoverable in the body. Until recently only six of these extraordinary solitary lesions had been described, but four years ago a seventh—a pedunculated tumour in the third ventricle—was recorded by T. G. Orr. I have previously stated, and still think, that in these rare cases infection travels up from the upper meatus of the nose via the sheath of the olfactory nerves.

The vertebral column may be involved in either abdominal or thoracic actinomycosis, but the spinal cord itself is rarely infected. The vertebral column is characteristically affected in a way quite different from that in any other form of infection. The process commonly affects the bodies and transverse processes, but it may invade any part with which it comes in contact. There is a very slow process of absorption but a simultaneous formation of new bone which maintains the framework and strength of the bodies, so that collapse of a vertebra is rarely seen and is never so complete as in tuberculosis. The intervertebral disks are involved late and often hardly at all. The disease may surround the exits of the nerves and may cause severe pain, but it is rare for the fungus to penetrate the spinal dura. The *x*-ray picture of vertebral actinomycosis is often pathognomonic, for the side view of the bodies gives one the impression of a coarse sieve, each opening being surrounded by a circle of denser bone.

Symptoms

How is it possible to enumerate, still less describe, the symptoms caused by visceral actinomycosis? It would require a short textbook to do so. In the early stages in any part there is nothing at all characteristic. The onset may be acute, subacute, or insidiously chronic. Irregular fever is the rule and there is moderate leucocytosis. Whenever the condition has existed for some time there will be increasing anaemia, lowered serum protein, wasting, and loss of strength. Pain may be absent or very severe, particularly if the vertebral column be attacked.

The local symptoms vary greatly according to the part affected. In the abdomen there is usually the formation of a hard swelling, which is significant when it forms around the sinus left by the drainage of an appendicular abscess. When such a tumour develops in the pelvis or around the colon without any previous warning it is usually taken for a malignant growth, although it seldom causes

acute obstruction. In the liver, which it may reach via branches of the portal vein or by direct contact, it may take the form of one or more localized tumour-like masses, or it may invade a large portion of one of the lobes and lead to the formation of large abscesses which disintegrate the glandular substance. I have known at least two cases in which fairly small localized masses in the liver were impossible of diagnosis until a portion had been removed for biopsy. Hepatic actinomycosis may lead to subphrenic abscess and pleural effusion.

When actinomycosis attacks the contents of the thorax it may closely simulate tuberculosis, pneumonitis, pleural effusion, empyema, or malignant growth; when it invades the mediastinum it may look like a mass of glands, or, when the vertebrae are involved, simulate osteomyelitis or give rise to meningeal symptoms.

Wherever it may penetrate, the actinomycotic process sooner or later always softens in one part or another and forms an abscess which generally comes to the surface of the body, often some way from the main focus. Such an abscess differs from that due to tuberculosis in that it is generally painful, causes redness and oedema of the skin and adjacent parts, and contains a thicker pus from which the granules can usually be obtained.

You will now understand why there are no characteristic symptoms. Visceral actinomycosis has a definitely ugly face but wears many masks: so many clinical pictures but the same insidious disease. One must therefore always consider the possibility of this disease.

Diagnosis

Even when one does consider its possibility there remains the difficulty of differential diagnosis. Actinomycosis might well be called the "most misdiagnosed disease." I know of no disease which is so often missed by experienced clinicians. Too many cases are diagnosed for the first time at necropsy. It is the rule for visceral actinomycosis to pursue its course for many months, sometimes for a year or two, before the possibility of its presence occurs to the observer. There are several reasons for this. First, we have no reliable reaction or blood test for the disease. Agglutination, complement fixation, estimation of the opsonic index, a precipitin test, and a cutaneous reaction have all been tried and advocated, but Naeslund (1931) found none of them reliable. Secondly, in the case of deep visceral lesions it may be months before an abscess from which the organism may be obtained comes to the surface. Moreover, it requires care and time to culture actinomyces, which soon dies if the pus dries, and which takes a much longer time to grow than the usual septic organisms. I purposely repeat that a final and important cause is that the disease may not be on the list of possible diagnoses which the observer goes through as a routine. The incidence of diseases has so altered through the last 40 years that (in my experience at least) it is now more common to meet with actinomycosis than with a syphilitic gumma. They should both be considered in doubtful cases.

The differential diagnosis has to be made from other causes of acute and chronic inflammation and from malignant growth. Syphilis may be excluded by the Wassermann reaction or other specific test. Tuberculosis and malignant disease of the lung cannot always be differentiated until an abscess has formed. The lesions in the intestine may closely simulate cancer, for there are many clinical resemblances. Both are often insidious in origin and prolonged in development, both advance inexorably into the neighbouring tissues, and in neither case is much respect paid to the nature of those tissues except in the case of lymphatic glands. In each case hard tumours may be formed. Finally, even microscopical examination may not reveal the fungus unless many sections are examined and the fibrous tissue reaction has led to the diagnosis of fibrosarcoma.

Since certain diagnosis can be made only by finding the actinomyces in the pus or tissues it is clear that there should be the closest co-operation between the pathologist and the clinician in diagnosing this disease. The surgeon's duty is not finished when he opens the abscess; he fails in his duty if he does not call the pathologist into consultation.

Treatment

During the past ten years the treatment of actinomycosis has changed remarkably for the better, and visceral infection, which gave a mortality of more than 50%, has now had to submit to a degree of control or even cure which was previously impossible. Much of the treatment used in 1939 is now out of date, although the books still insert them. Copper sulphate, formalin, salvarsan, thymol—all formerly advocated by some—have been superseded by the sulpha drugs and the antibiotics. There is little need for vaccines, and *x* rays are not so often required therapeutically, though they are sometimes of value in diagnosis. With the possibility of cure has come the fuller realization that visceral actinomycosis has a serious effect upon the general health and that constitutional treatment is very important. Amyloid is recognized as a serious complication.

Constitutional treatment consists in giving a plentiful and nourishing diet and carrying out the same rules with regard to fresh air and sunshine as in tuberculosis. Extra milk should be provided and the anaemia treated by haematinics or, if necessary, by transfusion. In no case should any operative measures be undertaken before the general strength has been built up.

With regard to drug treatment, iodine and its derivatives are still of value in promoting absorption, but potassium iodide is not a specific and need never be given in large doses. The best method of administering iodine is that of Chitty (1929), who recommends 5 min. (0.3 ml.) of tinctura iodi in a glass of milk thrice daily.

The discovery in 1935 by Domagk that prontosil red could cure streptococcal infection in mice led to its use in streptococcal and other infections in man. In 1937 Poulton, of Guy's, tried it in a case of streptococcal infection complicating a case of actinomycosis, and the patient improved greatly; the improvement, however, was attributed to the effect of the drug on the streptococcal infection. The following year a young officer in the R.A.M.C., by name Oliver Walker, was faced at Millbank by the case of a soldier suffering from actinomycosis following perforative appendicitis; there was a hard lump surrounding a right iliac sinus, and no benefit had accrued under treatment by potassium iodide and thymol. In this case Walker tried the effect of 1 g. of sulphanilamide three times a day for two periods of five days, and he was gratified to find that the whole condition rapidly resolved. He reported his success in a short and inconspicuous note (Walker, 1938).

This report encouraged two doctors at Cook County Hospital, Chicago (Miller and Fell, 1939), to report a similar case which they had independently treated successfully by the same drug. Soon many other cases were reported by Hall (1939), Ogilvie (1940), and Dorling and Eckhoff (1940), so that it became established that several of the

sulpha group of drugs had a definite beneficial effect on actinomycosis. In 1941 Cutting and Gebhardt showed that sulphanilamide, sulphathiazole, and sulphadiazine had a definite inhibiting effect on the actinomyces *in vitro*.

Penicillin

But very soon after this a still more powerful therapeutic substance was introduced into surgery—a substance discovered by a Fellow of this College. Forty years ago this last June, as I was waiting with trepidation for the result of the Fellowship of this College, I was pleased to see go in front of me into the Library to receive his Fellowship a young doctor called Alexander Fleming, who, needless to say, had passed at his first attempt. After gaining his Fellowship Fleming retired to work in the pathological laboratory, and one feared that he might be lost to surgery. But he retired only to do greater things for surgery after twenty years, for no single discovery in this generation has so improved the possibilities of surgery as the discovery of penicillin (Fleming, 1929).

When during the war Florey and Chain purified this substance and showed more clearly its clinical possibilities it was not long before its effect on the actinomyces was demonstrated. One of the first series of clinical trials by Florey (Florey and Florey, 1943) was a case of empyema in which a streptothrix was found; treatment by penicillin in comparatively small doses caused the disappearance of the streptothrix from the discharge. Since that time penicillin has been used more extensively for the treatment of actinomycosis, and as the supply became more plentiful greater doses were given and better results obtained. In 1947 Nichols and Herrell reviewed 98 cases of the disease, of which 45 were treated by penicillin and 53 without it. The period of disability caused by the disease was shortened by penicillin and was most striking with visceral actinomycosis. This is shown in the figures they quote:

Pulmonary.—With penicillin: five retarded, four failures. Without penicillin: 13, of which only one improved.

Abdominal.—With penicillin: seven, of which five were cured. Without penicillin: 14, of which nine died, four were still ill, and one recovered.

Pelvic.—With penicillin: three, all cured. Without penicillin: one, not cured.

In reading through the case reports from year to year certain facts stand out clearly. At first short courses of comparatively small doses were given; improvement occurred but did not prove lasting, so that repeated courses of treatment were required. Later, when bigger doses were used, the results were much better and cure was sometimes attained. Often, however, recurrence took place after an interval of some months. It then became evident that for severe cases of visceral actinomycosis it was necessary to give large doses of penicillin for long periods of time without intermission. That at least has been my personal experience.

That it has not been my experience alone may be judged by the writings of others. In 1946 Decker laid it down that "penicillin should be given in large doses, 100,000 to 200,000 units per day for 10 to 14 days. After several weeks' rest repeated courses of the treatment over 12 months, or at any time of recurrence." Two years later other observers (Nichols and Herrell, 1948) found that the dose given to their patients varied from 800,000 to one million units daily and was continued for from two to seven weeks; they concluded that the dosage should be at least half a million units daily and should be continued for at least six weeks. It is true that many cases get well with less than these amounts, particularly abdominal cases, but in difficult thoracic lesions it will be found that these doses are on the low side and at least a million units daily will be needed.

Short courses of treatment with penicillin are unsatisfactory, for then recurrence is the rule. There should be no intermission until the patient has been free from symptoms for some weeks or months. This has been well recognized by Adamson and Hagerman (1948), who reported a case of pulmonary actinomycosis successfully treated by penicillin and sulphadital: "Thus when dealing with pulmonary actinomycosis the most appropriate procedure seems to be chemotherapeutic treatment continued until long after the clinical symptoms have subsided." This is no place to discuss the methods of administering the penicillin, but my own preference is for giving two large and concentrated doses by intramuscular injection twice in the 24 hours. Three-hourly injections may be a great trial to the patient, and the intravenous method is not so convenient and does not give better results.

When the response to penicillin is slow or absent there may be some advantage in combining it with one of the sulpha group of drugs. Many observers have claimed better results by the combination of the two drugs. Certainly one of the few recorded cures of actinomycosis of the liver was from treatment by the combination of penicillin with sulphamerazine (Bonney, 1947). In some of the recorded cures by the combined method the doses of penicillin were much smaller than would be considered necessary nowadays.

For those patients who do not respond to treatment by penicillin other antibiotics are available. Two years ago Costigan found streptomycin of benefit in a case of cervicofacial actinomycosis, and last year Keefer and Hewitt found it had a beneficial effect in a case of abdominal infection. This year Torrens and Wood, and Pemberton and Hunter, also proved the value of streptomycin in abdominal actinomycosis. The former gave 2 g. a day for a month and then reduced the dose to 1 g. daily for a further period; the latter gave 1 g. daily for a month and let the patient take the drug by mouth. Usually the drug is given parenterally, for it is only slightly absorbed from the intestine. It cannot be continued for such long periods as penicillin without risk of toxic symptoms. Penicillin and streptomycin should not be given together, for the latter has a deleterious effect on the action of penicillin. There is another antibiotic—bacitracin (Meleney)—which has also been proved to have some curative power in actinomycosis, but this drug is not yet available in this country.

Conclusion

Here, then, we have several powerful drugs which can be used with great benefit against actinomycosis. We must now ask what place surgery has in treatment. The answer is—a diminishing one. Abscesses must be opened or, if small, aspirated. When the surgeon meets with a massive lesion of the stomach, intestine, or the kidney, excision of the affected part may be necessary; but it is never now needful to excise portions of lung or even to remove those masses of fibrous tissue which develop in this disease. In future, visceral actinomycosis will be treated chiefly by the antibiotics, the sulphonamide group of drugs, iodine in some form, and perhaps *x* rays to soften the hard tissue, while constitutional treatment will require full attention.

We have advanced far in the last ten years, but there remain many doubtful points in the pathology of actinomycosis to be solved. It was due to a distinguished Fellow of this College that treatment leaped forward: I have the

hope and faith to believe that some other Fellow of the College, perhaps some young doctor in this Hall, may be stimulated by what I have said to attempt to solve the problems which still remain.

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VAGOTOMY FOR PEPTIC ULCER*

INDICATIONS AND RESULTS

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It is now over two years since we reported from the Postgraduate Medical School a series of 50 peptic ulcer cases treated by vagus resection and concluded that results were promising enough to secure the operation an important place in ulcer therapy, though we indicated that this might eventually be mainly in support of other procedures (Orr and Johnson, 1947). Increasing experience has confirmed our view that vagus resection is a powerful weapon against ulcer recurrence, and, although it is primarily an attack on the fundamental diathesis and neurogenic hypersecretion, it will certainly bring about healing of many established ulcers.

Continued investigation has shown that vagotomy may be relied upon, when complete, to reduce spontaneous interdigestive gastric acid secretion substantially, and also to diminish acid response to a meal or to histamine injection. Furthermore, these effects have been shown to endure in cases where repeated insulin tests have established the completeness of the nerve section.

Once an ulcer has penetrated deeply and caused gross scarring in the restricted area of the duodenum, healing of the surface breach alone cannot be relied upon to rid the patient of his symptoms, and removal of the distorted stenosed rigid segment of bowel may become necessary. Vagotomy alone will seldom suffice in such a case. At an earlier stage, however, when the ulcer is still confined to the bowel wall, vagotomy by itself, with its negligible danger to life, may save the patient from years of semi-invalidism and pain with gradually mounting risks should he perforate or bleed.

Choice of Patients

The results achieved in a series of vagotomy cases will depend to a considerable degree upon the wisdom with which patients are selected for this operation. We have learned much from our failures, and are now able more confidently to say when vagotomy alone is likely to be a success and when it would be better combined with other procedures or not used at all. Selection must always be based upon very thorough investigation as well as upon certain special aspects of the history. Particularly important is the assessment of the relative prominence in the aetiology of hyperacid response to food, neurogenic hyperacidity, and excess of interdigestive and nocturnal secretion, and we employ special routine tests for this purpose.

The patient most suitable for vagotomy is one in whom there is a clear association between worry and relapse. This type of patient usually has a copious and very acid spontaneous night secretion and is often wakened at night by pain. A not unusual finding in such a case is 500 to 1,000 ml. of night secretion containing 60 to 80 units of free HCl. At the same time it may be remembered that vagotomy produces a lasting fall in acid response to food and to histamine injection.

One source of poor results with vagotomy alone is failure to recognize early pyloric stenosis. After vagus resection a quite moderate degree of narrowing may cause symptoms, as compensatory hyperactivity of gastric muscle has been abolished. We now realize the necessity for some form of by-pass operation whenever there is the least doubt of the absolute patency of the pylorus.

We have also learned that, whereas vagotomy will prevent recurrent duodenal ulcers and will usually completely heal an active ulcer confined to the bowel wall, once an ulcer has become grossly callous or has penetrated into the pancreas it may not heal after vagotomy alone, or, if it does heal, may cause recurrence of symptoms from contraction of scar tissue later. We now consider that such ulcers should be removed and that vagotomy should be added to prevent recurrence.

Indications for Vagotomy

An ulcer that shows a distinct tendency to recur under conditions of stress which cannot be eliminated or which are no more than the ordinary human lot should come to surgery, provided that the symptoms are not adequately controlled by simple medical measures while at work.

Vagotomy alone may be employed if at operation there is no hint of pyloric stenosis and the ulcer has not penetrated beyond the gut wall. The addition of gastro-enterostomy even in such cases is a wise precaution which may well become a routine measure with more experience. Only the fear that vagotomy might not ultimately prove an

*The largest group in the series here reported was operated upon at Hammersmith Hospital (Postgraduate Medical School of London) where this investigation was begun and has largely continued.

absolute protection against the late development of jejunal ulcer has deterred us from using this very satisfactory combination more often. This fear is growing less, as we have continued to see completely successful results in following up the patients so treated. In cases where duodenal ulcers have become large and callous or have penetrated into adjacent organs, or where gross haemorrhage has occurred, we recommend vagotomy plus hemigastrectomy.

This operation is very different from the high subtotal gastrectomy now usually employed for duodenal ulcer, being neither so mutilating nor so dangerous; nor is it followed by the unpleasant small-stomach syndrome, the inability to eat a proper meal, and the progressive weight loss now so commonly seen.

It is well known that, if only half the stomach is removed for duodenal ulcer, stomal ulcer subsequently develops in about one in ten patients (Rienhoff, 1945). Such recurrences respond well to vagotomy, and its use for anastomotic ulcer has gained distinguished supporters in recent years (Allen, 1947; Maingot, 1948). In employing a combination of vagotomy and hemigastrectomy in those duodenal ulcer cases unsuitable for vagotomy alone, it is our hope that the vagotomy will reduce the anastomotic ulcer rate to a figure at least as low as that for subtotal gastrectomy, while avoiding the unsatisfactory sequelae and greater mortality of the very high gastric resection. Vagotomy alone is a suitable operation for anastomotic ulcer after earlier gastro-enterostomy or gastrectomy in the majority of cases, and has the advantage of being a much less serious or dangerous undertaking than any alternative procedure available.

The vagi should not be divided in patients in whom at laparotomy no evidence of ulcer is found, unless this is deliberately undertaken for gross antral gastritis confirmed gastroscopically and accompanied by bleeding, or for recurrence of severe symptoms after gastrojejunostomy or gastrectomy when there is evidence of chronic jejunitis.

Results

Our series of vagal resections now numbers 215, 191 of them men and 24 women (Table I). Of these, 63 have been initially combined with hemigastrectomy and 21 with gastro-enterostomy; 20 have been undertaken for anastomotic ulcer. The earliest was performed five years ago, and 65 of them over two years ago.

TABLE I.—*Types of Operation*

	Cases	Operations
Duodenal ulcer	190	
Vagotomy alone		108
Vagotomy plus gastro-enterostomy		21
Vagotomy plus gastrectomy		61
Combined gastric and duodenal ulcers	5	
Vagotomy alone		5
Anastomotic ulcers	20	
Vagotomy alone		18
Vagotomy plus gastrectomy		2
All lesions	215	
Vagotomy alone		131
Vagotomy plus gastro-enterostomy		21
Vagotomy plus gastrectomy		63
Re-operations after vagotomy:		
Gastro-enterostomy		5
Gastrectomy		10
For duodenal fistula		1
Total operations		231

Vagotomy Alone

Early in our series we used vagotomy alone for all duodenal ulcers and anastomotic ulcers except one or two with well-established pyloric stenosis. We now realize that several of these subjects were unsuitable. None the less, a number of those in whom we would now consider a combined operation to be indicated still show first-class results with vagotomy alone.

Before we had become well practised at the operation we often failed to achieve complete denervation by the criteria of subsequent insulin tests. Dragstedt, who with his associates has done over 500 vagus resections, still draws attention to the very great difficulty of recognizing and dividing every fibre of both vagi. However, though there were 22 incomplete divisions among our first 100 cases, we have seen only six positive insulin responses among the next 100, and none at all among the last 50.

The results of these partial operations are altogether different and essentially unpredictable, for, though the percentage of failures is high, some of our most remarkable successes have been in this group, and the complications which sometimes follow vagotomy have been rare among them.

Of the 131 cases submitted to vagotomy alone (Table II), nerve section is believed to have been complete in 105.

TABLE II.—*Results of Operations Performed Over Six Months and Up to Five Years Ago*

Operation	No.	Still Symptom-free	Better but not Symptom-free	Failures
Duodenal ulcers and anastomotic ulcers after earlier operations for duodenal ulcers				
Vagotomy alone: "insulin negative" post-operatively	71	54 (76%)	13	4 (6%)
Vagotomy alone: "insulin positive" post-operatively	26	9 (35%)	5	12 (46%)
Vagotomy plus gastro-enterostomy, including vagotomy for anastomotic ulcer after gastro-enterostomy	29	25 (86%)	3	1 (3%)
Vagotomy plus gastrectomy: including vagotomy for anastomotic ulcer after gastrectomy, and gastrectomy for failure after vagotomy	66	58 (88%)	6	2 (3%)
Combined gastric and duodenal ulcers				
Vagotomy alone	5	3	0	2

Of these 105 probably complete vagotomies, 82 were for duodenal ulcer, 5 for combined duodenal and gastric ulcers, and 18 for anastomotic ulcers. Eleven cases of duodenal ulcer in which operation was performed less than six months ago, though satisfactory, have been excluded from analysis. In the remaining 71 duodenal ulcer cases in which vagotomy is believed to have been complete and in which the operation was done over six months and up to five years ago, 54 operations (76%) have been entirely successful, 13 have been only partially successful, and 4 have altogether failed to relieve symptoms.

Of the four complete failures, one patient had pyloric stenosis and two others developed stenosis later. These three have been re-operated upon with success, two having had hemigastrectomies and one a gastro-enterostomy. The fourth patient was relieved for only a few months by vagotomy and was then as bad as ever. At re-operation the large duodenal ulcer appeared to be soundly healed, and though a mass of scar tissue was present there was no obvious stenosis. Hemigastrectomy was performed, but the patient is still only partially relieved of his symptoms.

Of the 13 partial successes, one patient who had had a long history of severe pain and several haemorrhages was completely relieved of symptoms. Nevertheless he had a further haematemesis twelve months later. On re-exploration he was found to have a healed duodenal ulcer and several superficial gastric erosions. There was also some stenosis of the pylorus with gastric retention. Five patients have

dyspepsia from time to time, though their symptoms are not so severe as those experienced before operation. There is no *x*-ray evidence of recurrence, and the symptoms are readily controlled by simple medical measures. Two patients have occasional vomiting but no other symptom. Three have attacks of colic relieved by passage of flatus or belching. Two have intermittent diarrhoea, and, though the earlier one has now been free from trouble for six months, it is too soon to say confidently that this symptom permanently settles sooner or later.

The last of these 13 patients was operated upon two years ago for repeated haematemesis from a large but otherwise symptomless duodenal ulcer. Since operation he has not had another haemorrhage, but has not felt so well as before operation. We would not now submit such a patient to vagotomy alone.

Of the 26 patients in whom vagus resection was inadvertently incomplete, eight have been altogether free from symptoms since operation, up to five years and an average of three years ago. Five have been improved but are not symptomless and 12 have relapsed. Four of these have been submitted since to hemigastrectomy, one of them having a healed duodenal ulcer but a very large active gastric ulcer. Two others whose ulcers healed developed stenosis later and required gastro-enterostomy. Another has since had a massive haemorrhage from which he died.

We do not recommend vagotomy for patients with gastric ulcer, as we hold that there is no sound rationale for vagotomy in this condition, nor have the results of others who use it been convincingly successful.

Of the five cases of combined gastric and duodenal ulcer, three have been altogether cured for up to two years. In the other two cases the duodenal ulcers have healed, but the gastric ulcers continue to relapse. One of these has since been re-operated upon. However, it is possible to select certain patients with combined ulcers as suitable for vagotomy on the basis of the special investigations into secretion which we now make. By our present criteria neither of the two failures recorded in this group should have been vagotomized, for they both had long hypotonic stomachs showing no evidence of hyperacidity or excess of interdigestive secretion.

Vagotomy plus Gastro-enterostomy

Twenty-six patients with pyloric stenosis and active ulcers have had gastro-enterostomy with or after vagotomy, seven subsequently proving to have incomplete nerve section. A further 10 have had vagotomies for anastomotic ulcers after earlier gastro-enterostomy, so that there are 36 patients with this ultimate combination in the follow-up, which ranges, in their case, up to 4½ years. The only failure in this group has been due to the persistence of vomiting in one patient in whom nerve section was incomplete. Three others, two of whom also had positive insulin responses after operation, have periods when they are not altogether symptom-free. We have not used vagotomy for patients with pyloric stenosis and healed ulcers.

Vagotomy plus Hemigastrectomy

Sixty-three patients with large callous or penetrating ulcers have had vagotomy plus hemigastrectomy, and 10 have had vagotomies for recurrent ulcers after earlier gastrectomy. A further 10 patients have had gastrectomies later for the failures after vagotomy described above—one for a gastric ulcer which did not heal, one for haemorrhage from gastric erosions, four for pyloric stenosis, and four who relapsed after incomplete vagotomy. In all, 83 have had gastric and vagal resection. The follow-up of this group is relatively short, only the earliest having been operated on more than two years ago. So far the results on the whole have been very satisfactory, though one patient who had had two partial gastrectomies and two other operations for ulcer before he came to us was not much benefited by vagotomy. Six other patients continue to have intermittent symptoms less troublesome than their earlier ulcer distress. No case of anastomotic ulcer has yet been seen.

Other Effects of Vagotomy

Vagus section has had the unexpected effect of relieving constipation. Of the patients in the series 50% complained of chronic constipation, and 90% of these have developed regular habits since operation. In two patients constipation has returned after a few months of initial relief. Diarrhoea lasting one week or sometimes two weeks has occurred in several patients, but in only four (under 2%) has it persisted for longer or been really troublesome, and these patients consider themselves better off than before the operation.

Gain in weight over the immediate pre-operative level has averaged 5 lb. (2.27 kg.) in the first six months after vagus resection alone. After vagotomy plus hemigastrectomy it has averaged 4½ lb. (2 kg.) in the same period. This compares very favourably with the weight charts seen after subtotal gastrectomy (Johnson, 1948b).

Two patients who had suffered for several years from pulmonary tuberculosis as well as duodenal ulcer were operated upon at the request of their physicians because their nutrition could not be maintained at a satisfactory level for combating their infection. One has gained 14 lb. (6.35 kg.) in three months and the other 16 lb. (7.25 kg.) in 12 months since operation.

Complications.—The complications specific to vagotomy are nearly always mild and transitory, but are of special interest owing to the difficulty of explaining them on physiological grounds. Some patients notice that the stomach and bowel contain an excessive amount of wind, causing frequent eructation and passage of flatus, and occasionally giving rise to bowel colic. This condition, in our experience, has nearly always settled in a few months. If patients are closely questioned many will admit having had several sudden attacks of weakness, sometimes accompanied by sweating and trembling, and lasting twenty minutes, during the first few weeks after operation. In three or four cases these attacks have persisted, occurring about once a week, usually about 3 or 4 p.m., and often after heavy exercise. They were accompanied by low blood-sugar levels in two patients tested during attacks (Johnson, 1948b). Hypoglycaemia is a condition to which duodenal ulcer patients have a tendency without operation.

Mortality

There has been no death from vagotomy alone in this series (Table III). One elderly patient died from retention

TABLE III.—*Mortality*

	No.	Deaths	Mortality (%)
Vagotomy alone	131	0	0
Combined operations: Vagotomy plus gastrectomy or gastro-enterostomy	84	1	1·2
Re-operations (Gastrectomy, 10; gastro-enterostomy, 5; for duodenal fistula, 1)	16	1	6·2
All operations	231	2	0·87

of urine and uraemia following a combined hemigastrectomy and vagotomy, and a second died from an operation for closure of a duodenal fistula which developed after a difficult Billroth I gastrectomy with which vagotomy had also been combined. The overall mortality during the surgical treatment of these 215 patients has therefore been under 1%.

Commentary

The results of the investigations here recorded represent five years of study. During the first year little success was achieved beyond the development of a technique for complete vagus nerve section from below the diaphragm.

The percentage of failures among the early cases was high, but as the technique improved the proportion of incomplete vagotomies decreased, as did the proportion of failures. During the second and third years close follow-ups revealed the limitations of vagus resection as a therapeutic procedure in the treatment of duodenal ulcer, and some of the complications of vagotomy were recognized. Drainage operations were avoided at first, except when gross organic stenosis made it obligatory, until the effects of vagotomy alone had been studied. The observations made in this second period showed beyond question that complete vagotomy resulted in a marked fall in free acid, and that the low acid level was maintained in patients submitted to repeated secretion tests over a period of two years; but it also showed that in spite of a marked fall in free-acid level 25% of patients continued to complain of ulcer symptoms or suffered from recurrence after an initial period of well-being. Furthermore, it was noted that while 75% of vagotomized patients remained free from ulcer symptoms, certain side-effects of an unpleasant nature were apt to appear.

During the third and fourth years of study an analysis of good and bad results suggested that some of those who had been subjected to vagotomy were unsuitable subjects and that others presented too complicated a picture to be dealt with adequately by vagotomy alone, and combined operations were undertaken, such as vagotomy plus gastric resection or gastro-enterostomy.

The remaining period has confirmed that early uncomplicated cases of duodenal ulcer associated with high interdigestive secretion of free acid may be expected to obtain lasting benefit from vagotomy alone. For patients with a history of haemorrhage, perforation, scarring or deep crater formation—in other words, those most often presented to the surgeon—more radical operations are indicated. The results of these combined operations have been most gratifying, and the substitution of partial for high subtotal gastrectomy has done much to lower the post-operative morbidity and mortality of ulcer surgery.

Though resection plus vagotomy is the operation of choice at the moment, a prolonged follow-up of those patients who have had vagotomy plus gastro-enterostomy may prove that this is an adequate procedure with a minimal risk of stomal ulcer. Until this can be established beyond doubt, however, resection plus vagotomy must continue to be favoured. The scope of the resection is limited to removal of the ulcerated portion of the duodenum and enough of the pyloric half of the stomach to eliminate the secretory hormone element.

Summary

A series of 215 patients submitted to vagotomy over the last five years is reported. The results are satisfactory provided that the cases are skilfully selected and section of the nerves is complete. For large penetrating ulcers hemigastrectomy plus vagotomy has been tried, with, so far, promising results and avoidance of the "small-stomach syndrome" now becoming so common.

Despite our earlier fears, gastro-enterostomy plus vagotomy has continued to give excellent results in the small group in which it has been used.

The results of inadvertently incomplete vagotomy are variable and unsatisfactory, and only in the later part of our series did our technique become reliable in this respect.

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THE USE OF PROCAINE PENICILLIN WITH ALUMINIUM MONOSTEARATE IN ADULTS

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Of the many attempts which have been made to prolong the action of penicillin the most successful up to the present time have involved the use of the insoluble salt formed by combining penicillin G and procaine. By the use of this salt in fine suspension in arachis oil it has been claimed that bacteriostatic levels of penicillin in the blood can be maintained for 24 hours. While there is no doubt that in many cases this claim is justified, we have found in common with other observers (Emery, Stewart, and Stone, 1949) that the titre in the blood at 24 hours is very variable and often falls below the usually accepted minimum bacteriostatic level.

The retarding effect of aluminium stearate on the absorption of procaine penicillin has been pointed out by Buckwalter and Dickison (1948). The aluminium ester, which is a water-repellent, seems to produce a unimolecular envelope over the crystals and to delay their absorption. Observations on this preparation have been reported by Thomas, Lyons, Romansky, Rein, and Kitchen (1948), who found that a single injection of procaine penicillin in arachis oil with 2% (w/v) aluminium stearate maintained effective blood concentrations over a longer period than similar preparations without aluminium stearate. Robinson, Hirsh, Milloff, and Dowling (1948), using a similar preparation, found that the majority of cases had assayable blood levels after 24 hours and that one-third had assayable levels after 48 hours.

In this country Young, Andrews, and Montgomery (1949) have estimated the penicillin blood level after injection of procaine penicillin in oil with aluminium stearate. Estimations were made in 65 cases at 24-hour intervals

after a single injection of 300,000 units and in four cases at four-hour intervals. The effect of aluminium stearate in delaying absorption was confirmed. Eight patients received a single injection of 2,000,000 units of this preparation of procaine penicillin. This large dosage was tolerated well, and the indication is that very high blood levels can be obtained without incurring toxic effects from the large amount of procaine which must necessarily be administered at the same time. The prolongation of the effect of procaine penicillin by aluminium stearate has also been studied in children by Emery, Rose, Stewart, and Wayne (1949), who confirmed the advantage of the preparation over simple procaine penicillin suspensions in arachis oil.

The importance of particle size in prolonging the effect of procaine penicillin has been emphasized by Welch, Hirsh, Taggart, and Smith (1947). Thomas *et al.* (1948) likewise found that with preparations containing aluminium stearate the greatest prolongation was obtained where 95% of the particles were under 5 μ in diameter. On the other hand, Young *et al.* (1949) used preparations with a particle size of 5–20 μ with satisfactory results, and state that adequate blood levels were obtained with coarse particles of 60 μ, although such preparations tended to clog needles.

We have studied the penicillin blood levels in adults after standard doses of 300,000 units and 600,000 units of procaine penicillin in arachis oil with 2% aluminium stearate. Our estimations were carried out at relatively frequent intervals during the first 24 hours, and the blood levels were compared with those obtained after 600,000 units of penicillin in aqueous solution. We have also investigated the penicillin blood levels after daily injections of 600,000 units of the oily preparations, and in these observations preparations containing three different sizes of particle have been used.

Method and Results

Serum penicillin levels were estimated by dilutions in phenol-red–glucose–serum medium (May, Voureka, and Fleming, 1947) which were inoculated with *Streptococcus pyogenes* and compared with similarly inoculated dilutions of standard penicillin in the same medium. Injections were given to ward patients and to volunteers. Except in Cases 4, 9, 11, and 12 (see Tables I and II), to which attention will be drawn, we had no reason to think that the condition from which the patient was suffering would affect the blood levels reached.

Ten patients were given 300,000 units of the preparation, and the serum penicillin levels were estimated at frequent intervals for the first 24 hours and then 12-hourly for the next two days. The results are given in Table I. Two

TABLE I.—*Serum Penicillin Levels (u./ml.) Following the Injection of 300,000 Units of Procaine Penicillin with 2% Aluminium Stearate*

Case No.	Hours After Injection									
	1	2	3	6	12	24	36	48	60	72
1	—	—	0·5	0·25	0·125	0·125	0·06	<0·06	<0·06	<0·06
2	0·125	0·25	0·25	0·125	0·125	0·125	<0·06	<0·06	—	—
3	0·125	0·25	0·25	0·25	0·125	0·125	0·125	—	—	—
4	0·06	1·0	4·0	1·0	0·5	0·25	0·06	0·06	—	—
5	0·25	0·25	0·125	0·125	0·125	0·125	0·06	0·06	0·06	0·06
6	0·5	0·5	0·25	0·25	0·125	0·125	0·125	0·06	0·06	0·06
7	0·125	0·06	0·125	0·06	0·06	0·06	0·03	<0·03	<0·03	<0·03
8	0·5	0·25	0·125	0·06	0·125	0·06	0·06	0·03	0·03	<0·03
9	0·5	1·0	2·0	1·0	1·0	0·5	0·25	0·06	<0·03	<0·03
10	0·03	0·03	0·03	0·03	0·03	0·03	0·03	0·03	<0·03	<0·03

cases (Nos. 4 and 9) showed very high levels, which we attribute to impaired renal excretion, since Case 4 had congestive heart failure and Case 9 suffered from type II nephritis. These two cases have been excluded from the average figures, which are given in the composite graph, but they are of interest in showing the high levels reached when excretion is impaired. It will be noticed that we have taken as our minimum bacteriostatic level a concentration of penicillin of 0.06 u./ml., whereas many American observers accept a level of 0.03 u./ml. In making general statements about "bacteriostatic levels" the actual level accepted by a group of observers must clearly be taken into account.

Apart from Case 10, adequate serum levels were maintained for 24 hours, but it was realized that higher dosage might give consistently higher levels. A further 33 patients received a single injection of 600,000 units. The serum levels obtained are given in Table II. In Cases 11 and 12

TABLE II.—*Serum Penicillin Levels (u./ml.) Following the Injection of 600,000 Units of Procaine Penicillin with 2% Aluminium Stearate*

Case No.	Hours After Injection									
	1	2	3	6	12	24	36	48	60	72
11	8	8	16	8	2	1	0·25	0·125	0·125	0·125
12	16	1	1	0·25	0·5	0·25	0·25	0·125	0·125	0·125
13	—	—	—	—	—	—	0·5	0·125	0·06	0·03
14	0·25	0·25	0·5	0·125	0·25	0·125	—	—	0·06	0·03
15	0·5	0·5	0·25	0·125	0·25	0·125	—	—	0·06	0·03
16	0·25	0·5	0·5	0·5	0·5	0·125	—	—	—	—
17	0·25	0·5	0·25	0·25	0·25	0·25	0·25	0·125	0·125	<0·03
18	0·125	0·25	0·125	0·125	0·125	0·06	0·03	0·03	0·125	0·06
19	0·125	0·5	0·25	0·06	0·06	0·06	0·03	0·03	0·03	0·03
20	0·5	1	2	0·5	0·5	0·5	0·25	0·25	<0·03	<0·03
21	0·03	0·03	0·06	0·03	0·125	0·06	0·06	0·03	<0·03	<0·03
22	1	1	1	1	0·5	0·25	0·125	0·125	<0·03	<0·03
23	0·5	0·5	0·5	1	0·5	0·125	0·25	0·125	0·03	<0·03
24	0·5	0·25	0·25	0·25	0·5	0·25	0·125	0·125	0·03	0·03
25	2	2	4	0·25	0·25	1	1	0·5	0·125	0·06
26	0·25	0·5	1	1	1	1	1	1	1	1
27	0·5	0·5	0·5	0·25	0·5	0·125	0·5	—	0·06	—
28	0·5	0·5	0·5	0·5	0·5	0·25	0·25	—	—	—
29	0·5	1	0·5	0·25	0·25	0·25	0·25	0·125	—	0·03
30	0·5	1	0·5	0·5	0·5	0·125	0·125	0·06	—	0·03
31	0·5	0·5	0·5	0·5	0·5	1	0·25	0·25	0·25	0·25
32	0·5	0·5	0·5	0·5	0·5	0·5	0·5	0·25	0·25	0·125
33	1	1	1	0·5	1	0·5	0·25	0·25	0·125	—
34	1	0·5	0·5	1	—	0·25	—	0·03	—	0·03
35	1	1	1	2	—	0·25	—	0·125	—	0·06
36	0·5	1	0·5	1	—	0·06	—	0·03	—	0·03
37	1	—	0·5	2	—	0·125	—	0·03	—	0·03
38	—	1	1	—	0·5	0·5	0·25	0·25	0·125	0·125
39	—	0·25	0·25	0·25	0·25	0·125	0·125	0·25	0·125	0·125
40	—	0·25	0·25	0·25	0·25	0·25	0·25	0·25	0·125	0·03
41	1	0·5	1	2	0·25	0·25	0·06	0·06	0·06	0·06
42	1	1	1	0·5	0·5	0·25	0·06	0·06	0·06	0·06
43	0·5	0·5	0·5	0·5	0·5	0·25	0·06	0·06	0·06	0·06

the levels were so much higher than in the rest that they have been excluded from the composite curve. In Case 11 renal deficiency was present, but we could find no reason for the very high serum level at one hour in Case 12, which was a case of gout. From Table II and the composite curve it will be seen that serum levels at or above 0.06 u./ml. are present in every case at 24 hours and at or above 0.03 u./ml. at 48 hours. At 72 hours, out of 29 cases in which estimations were made, 24 had serum levels at or above 0.03 u./ml. The composite curve shows that the average level is above 0.06 u./ml. at 72 hours. For comparison, three patients were given 600,000 units of crystalline penicillin G in water; the composite curve is shown in the Chart.

We next investigated the serum levels attained with daily doses of 600,000 units of procaine penicillin and aluminium stearate for four days. For this purpose we used three preparations from different manufacturers, A, B, and C. Over 95% of the particles in preparation B were much below 5 μ in diameter and there were no large particles. This is the preparation which has been used in the investigations described above. Preparation A contained some rather large crystals, but the great majority were much below 5 μ in size. In preparation C the crystals were also

rather large—approximately 5–20 μ. The results are set out in Table III. With preparations A and B remarkably constant serum levels were achieved, so that the composite curve is practically level. With preparation C the levels reached were not so constant. Although the total number of cases studied is small, we think this result is not due to chance and that small particle size is desirable. After the fourth day no further injections were given, but detectable quantities of penicillin were present in the blood 72 hours later in those cases in which estimations were made.

TABLE III.—*Serum Penicillin Levels (u./ml.) After Daily Injections of 600,000 Units of Procaine Penicillin with 2% Aluminium Stearate for Four Days Using Preparations with Three Different Sizes of Particle*

Preparation	Case No.	Hours After Injection					
		24 (Day 1)	24 (Day 2)	24 (Day 3)	24 (Day 4)	48 (Day 5)	72 (Day 6)
A	44	0·5	0·5	0·5	0·5	—	—
"	45	0·5	0·5	0·5	0·5	—	—
"	46	0·125	0·125	0·125	0·125	—	—
"	47	0·25	0·5	0·5	0·5	—	—
"	48	0·125	0·25	0·25	0·25	—	—
B	49	0·5	0·5	0·5	0·5	0·25	0·5
"	50	0·25	0·25	0·25	0·25	0·125	0·03
"	51	0·25	0·06	0·25	0·25	0·125	0·06
"	52	0·25	0·25	0·25	0·25	0·25	0·125
"	53	0·25	0·25	0·5	—	0·125	0·125
C	54	0·25	0·25	0·125	0·06	0·06	0·06
"	55	0·125	0·5	0·25	0·125	0·06	0·06
"	56	0·25	0·06	0·06	0·03	0·03	—
"	57	0·25	0·25	0·25	0·06	0·03	0·03
"	58	0·25	0·25	0·125	0·06	0·03	0·03

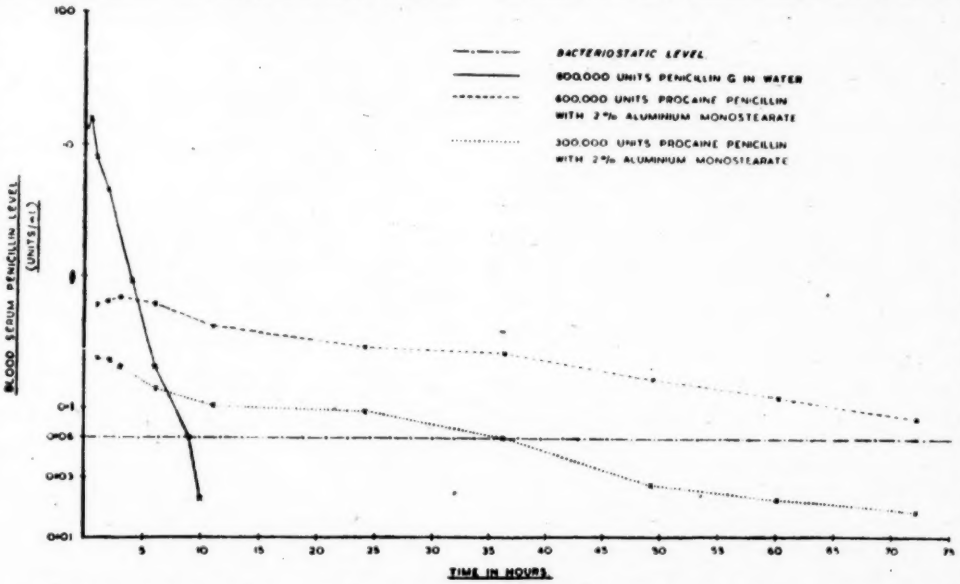
BACTERIOSTATIC LEVEL
600,000 UNITS PENICILLIN G IN WATER
600,000 UNITS PROCAINE PENICILLIN WITH 2% ALUMINIUM MONOSTEARATE
300,000 UNITS PROCAINE PENICILLIN WITH 2% ALUMINIUM MONOSTEARATE
BLOOD SERUM PENICILLIN LEVEL (UNITS/ML.)
TIME IN HOURS

Chart showing the average serum levels of penicillin reached after single doses of 300,000 units (8 cases) and 600,000 units (31 cases) of procaine penicillin with 2% aluminium stearate. The average levels after a single dose of 600,000 units of penicillin G in water are shown for comparison. The concentration of penicillin is plotted on a logarithmic scale.

Serum penicillin levels were also estimated in one patient after 600,000 units of procaine penicillin with aluminium stearate both before and during the administration of caronamide in doses sufficient to give effective blood levels. The results are shown in Table IV. During caronamide administration significantly higher blood levels were achieved 36, 48, 72, and 96 hours after the penicillin had been given.

TABLE IV.—*Serum Penicillin Levels After Two Injections of 600,000 Units of Penicillin with Aluminium Stearate, One Before and One During the Administration of Caronamide. The Caronamide was Given in 4-g. Doses Four-hourly by Mouth for 96 Hours Starting 24 Hours Before the Second Injection*

Hours After Injection	Serum Penicillin Levels (u./ml.)		Serum Caronamide Levels (mg./100 ml.)
	Before Caronamide Administration	During Caronamide Administration	
12	0·25	0·25	38
24	0·125	0·125	46
36	0·125	0·25	44
48	0·125	0·25	56
72	0·06	0·25	60
96	0·03	0·125	9

Discussion

When penicillin was first introduced it was assumed that the best clinical results would be obtained by maintaining a level of penicillin in the blood which was always above the minimum bacteriostatic level for the organism causing the disease. Consequently, continuous intravenous and, later, intramuscular drips were used. It then became abundantly clear that equally good clinical results could be obtained by the intermittent intramuscular injection of penicillin every three hours during the day and night. With the necessity for conserving the limited supplies of penicillin then available, this method was undoubtedly justified, but later, when it was possible to use much higher doses, it became the custom in general practice to give no more than two injections in each 24 hours. Indeed, it would rarely have been possible to treat patients in their own homes by any other system of dosage.

By this method clinically satisfactory results can be obtained in many minor disorders, such as those ordinarily treated in a casualty department, and we can ourselves vouch for the adequacy of six-hourly injections of 120,000 units of penicillin in water in the treatment of pneumococcal pneumonia. Similar clinical results have been reported by other observers (Wheatley, 1947, 1949; Barclay, 1949; Tompsett, Timpanelli, Goldstein, and McDermott, 1949). It should be remembered that it was originally assumed that the best results would be obtained by maintaining a bacteriostatic level of penicillin in the blood. It has been argued that an interval without penicillin in the blood may allow dormant organisms to undergo active multiplication; for it is only at this time, as Chain and Duthie (1945) have shown, that they are susceptible to the drug. It has also been argued that the very high levels obtained after a large single dose of penicillin in aqueous solution will enable penicillin to pass into relatively avascular tissue by diffusion. The bacteriostatic action of penicillin may indeed apparently persist some time after it can no longer be detected in the blood. The evidence in favour of the discontinuous use of penicillin has been reviewed by Marshall (1948).

Eagle and Musselman (1948) and Eagle (1948), on the other hand, have brought forward evidence which suggests

that the maximum bactericidal effect of penicillin is achieved by comparatively low blood penicillin levels of the order of 0.1 u./ml., and that there is no advantage in attempting to reach higher concentrations except in the case of relatively insensitive organisms. Indeed, there may be an actual disadvantage, since with some bacteria high concentrations reduce the bactericidal effect. It cannot be said that it is yet known with certainty whether discontinuous or continuous methods of administration are preferable. Tompsett *et al.* (1949) compared the effect of 300,000 units of aqueous penicillin given twice daily with that of a single injection of 300,000 units of procaine penicillin. Both systems of treatment gave satisfactory results in pneumococcal pneumonia.

It should be pointed out, however, that almost all the clinically satisfactory results reported have been achieved with methods which give a relatively stable blood concentration, and that, so far, there is no similar mass of clinical evidence in favour of discontinuous administration. Maintenance of a steady blood penicillin level is easy to achieve by a single daily dose of the preparation we have been investigating, and if a single estimation of the blood penicillin level is made it may be assumed that this will be constant from day to day. It is possible to impose a daily peak on this steady level by adding soluble penicillin to the injection if the theoretical arguments in favour of this procedure are felt to be impressive enough.

There is evidence that in the treatment of infections with sensitive organisms penicillin in oil with aluminium stearate is clinically effective (Boger and Flippin, 1949). Mahoney (1949) states that three injections of 600,000 units give as satisfactory results in the treatment of syphilis as the standard three- or four-hourly injections. There is no reason to doubt the efficacy of the preparation in any infection provided the sensitivity of the organism is estimated and the penicillin blood level is occasionally checked. The advantages of using this preparation of penicillin are the increased comfort of the patient, who need be subjected to but one painless injection a day at the most. There is also a great saving of time of the medical and nursing staff. The aluminium stearate tends to prevent sedimentation and make the preparation more fluid.

The advocates of discontinuous therapy with aqueous penicillin advise at least two injections in 24 hours, and oral administration of penicillin involves frequent dosage with not very palatable preparations. Our limited experience with procaine penicillin in oil in adults agrees with that of Emery, Stewart, and Stone (1949) in children. They found very variable blood levels. Emery, Rose, Stewart, and Wayne (1949), however, were able to maintain bacteriostatic levels in children when procaine penicillin in oil with aluminium stearate was used, and our results in adults are again in agreement.

We have used procaine penicillin with aluminium stearate in the treatment of several cases of urinary-tract infections with good results, also in a few other infections. It would be necessary, however, to treat a large number of comparable cases by this method and by standard three-hourly injections in order to make a statistically acceptable comparison.

We have seen no reactions in any patient, and the injections are almost painless. It seems probable that the preparation will become a standard form of penicillin administration except in cases in which resistant organisms are concerned.

Summary

Procaine penicillin in arachis oil with 2% aluminium stearate has been given in single doses of 300,000 units to 10 individuals and in single doses of 600,000 units to 33 individuals. The blood-serum penicillin levels have been estimated at frequent intervals. With the lower dose, bacteriostatic levels (above 0.06 u./ml.) were maintained for 24 hours in all but one case. With the higher dose, bacteriostatic levels were maintained for 24 hours in every case, and the average level remained above 0.06 u./ml. for 72 hours.

Daily doses of 600,000 units for four days were administered to 15 patients, using preparations with three different sizes of particle. Remarkably constant bacteriostatic levels were maintained while the injections were being given, especially with preparations containing many particles of small size. Detectable quantities of penicillin were present in the serum three days after administration had ceased.

One patient received caronamide before and after a single dose of 600,000 units of procaine penicillin with 2% aluminium stearate. Significantly higher levels were reached than when caronamide was not administered.

The arguments in favour of discontinuous administration of large doses of penicillin are reviewed, and it is concluded that the balance of evidence is in favour of a maintained steady blood penicillin level such as is attained by the daily administration of 600,000 units of procaine penicillin with 2% aluminium stearate.

We should like to thank Dr. H. Brody for permission to include in our series observations on some of his cases. The penicillin preparation used in most of the investigations was kindly supplied by Imperial Chemical (Pharmaceuticals), Ltd., Manchester.

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The results of an investigation to establish norms for heights and weights of infants and pre-school children has recently been published by the Department of Health of the Melbourne City Council. It is the standard practice at the health centres in the city to record and chart the weight of each child who attends, and the investigation was planned to provide information about average heights and weights in the years 1926, 1936, and 1946. The results are presented in a set of tables with accompanying graphs. The main features are: (1) The difference in the average height of males and females seems to be so great that separate norms are required. (2) There has been a considerable rise in the average height and weight of infants and pre-school children in the city of Melbourne between 1936 and 1946. Such evidence as was available suggested that there had been a smaller increase between 1926 and 1936. (3) The average weight of infants in the city of Melbourne is apparently about the same as that shown by the most recently available data from New Zealand. (4) The average weight of infants is considerably higher than that which is shown as normal on the printed graphs used at the infant-welfare centres in the State of Victoria.

HERPES ZOSTER AFTER IRRADIATION

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Since 1935 one of us (F. E.) has been of the opinion that clinically typical zoster occurring in patients who had received radiotherapy probably resulted from the treatment. The numerical incidence of zoster generally in the population is not known, so that statistically the point is difficult to prove; we believe, however, that there is presumptive evidence of such correlation.

Although the virus nature of zoster is now accepted, there is still a considerable difference of opinion on the importance of various factors predisposing to attack by the virus. Apart from the idiopathic type of disease occurring especially in adults, the infection may also arise after contact with a case of varicella, during the course of acute or chronic infections—e.g., influenza, pneumonia, or tabes—as a result of trauma to the skin (Klauder, 1947) or injury to the spine, and following poisoning by certain drugs—e.g., arsenic, mercury, or benzol. In addition, there is some association between zoster on the one hand and various forms of reticulosis and cancer, and possibly radiotherapy, on the other. The discussion and analysis of cases which follow are an attempt to clarify this latter connexion.

Pathology of Zoster

In 1900 Head and Campbell carried out pathological examination of the nervous system at necropsy on 19 patients with zoster who died in an institution within 7 to 390 days of the appearance of the eruption. In all cases a lesion was found in the posterior spinal root ganglion corresponding to the skin area involved. In all cases of zoster of the face, either the Gasserian ganglion of the fifth nerve or the geniculate ganglion of the seventh nerve was involved. Wohlwill (1924), however, in a pathological examination of six cases of idiopathic zoster, and in four cases of secondary zoster, somewhat modified the classical conception. He demonstrated that, although involvement of the posterior root ganglion is the common lesion, in some cases the posterior root itself, the posterior horn, or the anterior branch of an intercostal nerve might alone be involved as a cause of the zoster. He thus suggested that the eruption might result from involvement of any part of the afferent portion of the reflex arc without specific involvement of the posterior root ganglion.

With reference to the evidence that the virus of varicella and that of zoster are probably identical, and bearing on the ensuing discussion, Sequeira *et al.* (1947) quote an interesting suggestion. They postulate that during an attack of chicken-pox the virus spreads throughout the body and possibly settles in the central nervous system. It lies dormant there, but may be aroused to activity by various factors, including trauma, infection, and drugs. Such a hypothesis would link together all the following factors.

Reticulosis and Zoster

Many pathological observations have been made on the development of zoster during the course of Hodgkin's disease, lymphosarcoma, and leukaemia (especially of the lymphatic type).

With regard to clinical observations, Craver and Haagensen (1932) quote seven cases in which zoster developed out of 329 cases of reticulosis treated. In five of the seven cases the zoster was preceded by exacerbation of the glandular or splenic enlargement in the neighbourhood of the ganglion involved. None of the cases showed clinical involvement of the spine by the reticulosis. These authors thus suggest the possibility that infiltration of the ganglia by the reticulosis leads to a sensitization of the nerve cells to the zoster virus. Irradiation is not suggested as a possible cause.

Halle (1930) assessed 16 cases from the literature of zoster occurring during leukaemia, and Pancoast and Pendergrass (1924) describe four cases of zoster occurring during Hodgkin's disease. The frequency of zoster in Hodgkin's disease has been variously described as 13.4% in a series of 46 cases (Baldridge and Awe, 1930) and as low as 0.64% in a series of 156 cases (Epstein and McEachern, 1937). By adding together all reported series where zoster was noted, a total of 15 cases of zoster are reported in 576 cases of Hodgkin's disease, a proportion of less than 3%. In lymphosarcoma and leukaemia the average incidence of zoster is less than 1% in a large group of cases. The variation in these figures has no definite significance, since varying numbers of cases developing zoster would be missed in each series.

Cancer and Zoster

The literature has fewer references to the association between cancer and zoster. A classical instance was noted by Charcot and Cotard (1865), who reported a case of cervical zoster associated with the presence of spinal metastases from a carcinoma of the breast. Pancoast and Pendergrass (1924) quote a case of carcinoma of the ovary with multiple metastases in which D11–L1 roots were involved by zoster. Wohlwill (1924) mentions a case of carcinoma of the stomach with involvement by carcinoma of the intercostal nerve and herpetiform eruption in the skin area supplied by that nerve. Carrière (1895) mentions a case in which zoster developed in the skin of the thigh in a case of carcinoma of the cervix uteri. Neuritis of the femoro-cutaneous nerve without infiltration by the neoplasm was shown at necropsy, and Carrière attributes the neuritis to the local action of cancer toxins. Head and Campbell (1900) and Hall (1923) mention the connexion between cancer and zoster.

The development of zoster may be the preliminary sign of the development of a tumour. Kamman (1928) describes a case of zoster of the sixth intercostal nerve which was the first sign of the development of an intradural cyst at the level of the sixth dorsal segment.

Pendergrass and Kirsh (1948), in an analysis of the results of irradiation in carcinoma of the breast, quote 16 cases of zoster in 406 patients with carcinoma mammae —a proportion of 4%. Of the 16 cases, 14 had received irradiation and 15 had zoster of the thoracic region (an interesting observation in view of the thoracic location of the primary growth). In 12 of the cases there was evidence of metastases before or after the appearance of the cutaneous disease (suggesting the possibility of involvement of the spinal ganglion by the disease), but, on the other hand, four of the patients survived for 4 to 12 years after the zoster with no signs of metastases. No hypothesis regarding the association of the zoster is hazarded.

Paracchi and Pricolo (1943) quote four cases of zoster developing in the course of carcinoma and one in the course of Hodgkin's disease. In three cases of uterine cancer the zoster involved the lumbar root area. The authors state that in all cases the herpetic eruption was on

the same side and in the same region as the spread of the tumour. All the cases had received irradiation. The follow-up in these cases is not reported, but the authors suggest that the development of zoster may be a preliminary to spread of the disease. Irradiation is not considered as a possible cause.

X Rays and Zoster

In most of the cases of zoster associated with reticulosis or with cancer previously referred to in this paper the patients had received irradiation treatment. Schreus (1926) reports a case of zoster arising within 40 days of irradiation of the neck for enlarged glands, and suggests that the effect of irradiation, resu'ting as it does in hyperaemia, may decrease the resistance of the root ganglia to infection with the virus or that a slumbering infection in the ganglia may be awakened. It is possible, however, that the effect of *x* rays on the skin may lead to zoster, as suggested by Klauder (1947) for mechanical injuries.

The implication of irradiation as an aetiological factor in the development of zoster may be deduced from the facts previously mentioned from Craver and Haagensen, Pendergrass, and Paracchi and Pricolo, although the authors did not accept this possibility.

With reference to the effect of irradiation upon the nerve tissue the observations of Mogilnitzky and Podljaschuk (1929, 1930) are important. They note that after irradiation of the brain of adult experimental animals by fractionated doses of *x* rays, substances such as trypan blue and saccharated ferrous oxide are able to pass from the blood into the brain tissue. This does not occur without irradiation, and the authors conclude that there is a breakdown of the haemato-encephalic barrier—the protective barrier of the brain against toxins and other poisons circulating in the blood. This experimental work supports the hypothesis of Schreus (1926).

Most reports on the effect of *x* rays on nervous tissue are based on animal experiments, but the general results of observation suggest to Warren (1943) that the direct effect of irradiation on the brain and spinal cord is very slight (nerve tissue being resistant), but the secondary effects—namely, endarteritis and thrombosis—may lead to complications. In fact, Janzen and Warren (1942), delivering up to 10,000 r of 200 kV *x* rays, showed as a result no pathological change in the peripheral nerves of rats.

An interesting observation is made by Greenfield and Stark (1948), who describe three cases of post-irradiation neuropathy occurring among 180 cases of seminoma testis treated post-operatively to the retroperitoneal region by 1-million-volt *x* rays. The patients deve'oped a flaccid paralysis of the legs without associated sensory lesions, and there was no evidence of metastatic involvement of the region. The lesion is considered to have developed as a result of irradiation damage to the anterior horn cells, and the latent period of three to five months between completing irradiation and the development of the neuropathy suggests that the effect is not directly upon the nerve tissue but follows vascular deficiency and gliosis. The dose in the region was about 5,000 r.

This latent period of three to five months is almost exactly that which forms the peak incidence of the latent period between irradiation and zoster noted in our series of cases, thus suggesting that gliosis or late fibrosis may be associated with the development of zoster. It is of interest, however, that, in spite of the serious damage to the motor system, zoster did not develop, suggesting that some additional factor—e.g., an immunological factor—may be necessary for zoster to follow irradiation.

Analysis of Cases

The number of cases considered is 45, all developing zoster after previous irradiation. (A further 20–25 cases have been noted, but their records have been lost.) Of the total, 39 cases are of malignant disease (including 24 cases of carcinoma of the breast) and six of non-malignant disease.

Carcinoma of the Breast

This group of 24 cases provides the main and most instructive part of the study because of its homogeneity It includes two subgroups :

1. This consisted of 12 cases treated with radical mastectomy followed by post-operative deep *x* rays in all cases (Table I). In this group zoster developed some months after the prophylactic course of irradiation, there being no signs of recurrence of the disease. The group is thus a uniform series treated by a uniform surgical technique followed at an interval of two to four months by a uniform course of irradiation. In the absence of clinical signs of malignancy at the time of zoster, and accepting the evidence of the case histories that zoster was not a premonitory sign of spread of malignancy, then the neoplastic process *cannot* be incriminated in the development of the zoster in this group of cases. The clinical evidence, however, tends to incriminate the course of irradiation, as is seen later. In this respect it must be noted that the area treated includes the skin of the chest wall affected (and also the medial part of the contralateral chest wall), together with the supraclavicular and axillary gland areas. It is of interest that, with the technique used, areas of the skin supplied by roots C3–D8 (approximately) are irradiated. The upper dorsal vertebrae at the level D1–3 (approximately) are included at the edge of the field of irradiation and in some cases the spinal roots on *both* sides in this region may be irradiated (see Fig. 1). Of the 12 cases, 10 were histologically proved carcinoma, and in two the evidence was clinical only.

2. This subgroup comprised 12 cases which were treated by various methods primarily and in which different techniques of

TABLE I.—*Carcinoma of Breast—Subgroup 1. Twelve Cases of Carcinoma of Breast Treated by Radical Mastectomy and Prophylactic Irradiation*

No.	Age	Sex	Side of Neoplasm	Site of Zoster	Relationship	Interval	Follow-up after Zoster	Diagnosis
A 304	50	F	Right	Right C	Ipsilateral	13/12	NSR 25/12	Histological
A 1077	61	F	,,	Left D4	Contralateral	3/12	NSR 30/12	Clinical
C 75	44	F	Left	Left D6	Ipsilateral	10/12	No F.U.	Histological
C 618	49	F	,,	?	?	9/12	No F.U.	,,
C 620	62	F	Right	Right D11, 12	Ipsilateral	8/12	NSR 9/12	,,
C 690	73	F	Left	Left C3, 4	,,	13/12	NSR 7/12	,,
C 781	58	F	,,	Right D2	Contralateral	6/12	NSR 11/12	,,
C 1135	51	F	Right	Left D4	,,	3/12	NSR 9/12	Clinical
A 20	64	F	Left	Left D (upper)	Ipsilateral	3/12	Died 11/12 Met. liver	Histological
B 378	59	F	Right	Right D (upper)	,,	4/12	26/12 Met. femur	,,
B 624	69	F	,,	Right C1–3	,,	12/12	NSR 16/12	,,
B 1162	47	F	,,	Left D10, 11	Contralateral	16/12	NSR 10/12	,,

NSR = No signs of recurrence. No F.U. = No follow-up.

irradiation were practised when metastases or recurrences were clinically evident or suspected (Table II). This is a much less uniform group than the previous one, but is analysed for its confirmatory relation to the other group. The presence of active neoplasm at the time of the irradiation (and possibly at the time of the zoster) is an additional factor that may be involved in the development of zoster. Of the 12 cases in this group 10 were proved either histologically or at the death of the patient, and two were established clinically.

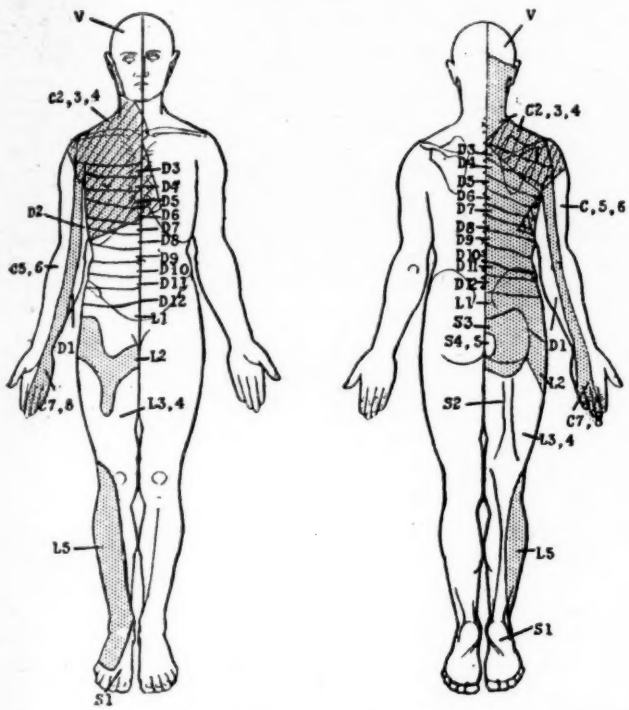

FIG. 1.—The cutaneous areas supplied by the posterior nerve roots; showing skin areas irradiated in standard breast technique.

The analysis is carried out under four headings for the group as a whole.

I. *Site.*—The following table shows the site involved. In each subgroup separately and for both together the upper dorsal region shows the peak incidence for zoster, and in fact represents the majority of all the cases. In idiopathic zoster the dorsal region generally shows a greater involvement than any other site. In our group of cases, however, the large preponderance of the upper dorsal site (and also the cervical site) suggests a relationship between the zoster and the site involved by the malignant disease and treated by surgery or irradiation. In Pendergrass's series of zoster in carcinoma mammae, of the 16 cases 14 had received irradiation, and in 15 cases the dorsal region was involved. In Paracchi and Pricolo's series, of the three cases of carcinoma of the uterus, all developed zoster in the lumbar area, and all had been treated by irradiation.

	Fifth Nerve	Cervical	Upper Dorsal	Lower Dorsal	Lumbar	Not Specified	Total
Subgroup 1	—	3	6	2	—	1	12
„ 2	1	1	7	1	—	2	12
Total ..	1	4	13	3	—	3	24

II. *Side.*—There is some preponderance of involvement by the zoster on the side of the malignant lesion. Even when the cases involving the upper dorsal region are considered there is again a slight preponderance of ipsilateral involvement, as here shown. Thus if the possibility of

	Ipsilateral	Contralateral	Site not Specified	Total
Subgroup 1 ..	7	4	1	12
„ 2 ..	5	3	4	12
Total ..	12	7	5	24

	Ipsilateral	Contralateral	Total
Upper dorsal zoster, subgroup 1	3	3	6
„ „ „ „ 2	5	2	7
Total ..	8	5	13

TABLE II.—*Carcinoma of Breast—Subgroup 2. Twelve Cases of Carcinoma of Breast with Various Treatments*

No.	Age and Sex	Treatment	Site of Zoster	Relationship	Interval	Notes	Follow-up after Zoster	Diagnosis
A 695	52 F	DXR L chest DXR R breast	Right V	Contralateral Ipsilateral	16/12 11/12	Varicella same time as zoster	ISQ 24/12	Histological
251	52 F	DXR L chest	Right D1, 2	Contralateral	47/12 9/12	Effusion after 10/12	Died 14/12 metastases pleura	Clinical
A 352	72 F	DXR LSC"	?	"?	15/12		Died 5/12 ? cause	Histological
407	58 F	DXR R chest DXR RSC and axilla	Right D6	Ipsilateral "	8/12 3/12		Died 7/12 metastases lungs	Clinical
C 119	48 F	DXR L " " and spine	?	"?	1/12 6/12	Metastases D4 and 5, 6/12 before zoster	Died 8/12 metastases liver	Histological
C 80	65 F	DXR R chest	Right D3,	Ipsilateral	9/12		ISQ 10/12	„
B 1097	65 F	DXR dorsal spine	Right D11	—	2/12	DXR for Paget's disease. Varicella in contact 1/12 later	NSR 21/12	Clinical
35	46 F	DXR pelvis	Left C2, 3	—	20/12		ISQ 40/12	„
O 42	46 F	Excision and radium L breast DXR L chest DXR spine DXR ribs	Left D2, 3	Ipsilateral " — —	144/12 84/12 24/12 12/12	Metastases spine 24/12 before zoster	ISQ 4/12	Histological
185	48 F	Excision and radium L breast DXR L axilla	Left D3–6	Ipsilateral "	28/12 12/12		ISQ 48/12	„
O 192	64 F	DXR L breast " DXR LSC"	Right D (upper)	Contralateral " "	44/12 8/12 3/12		Died 1/12 metastases lungs	Clinical
D 795	65 F	DXR R breast DXR R chest	Right D1, 2	Ipsilateral "	9/12 6/12		ISQ 1/12	Histological

DXR = Deep *x*-ray therapy. ISQ = *In statu quo.* NSR = No signs of recurrence. LSC = Left supraclavicular fossa. RSC = Right supraclavicular fossa.

metastatic involvement of the spinal roots is negatived by consideration of the follow-up notes and also by the absence of any other clinical symptoms, then the effect of *x* rays on the root ganglia or on the skin of the opposite side must be considered to account for contralateral involvement. It has already been pointed out that the spinal roots of *both* sides at the level of D1–3 may be included in the field of irradiation in the post-operative breast-irradiation technique, and in addition the skin of the contralateral chest wall supplied by spinal roots D2–6 (approximately).

In this connexion Pendergrass observes that nine of the cases of zoster were on the same side as the neoplasm of the breast and three were on the opposite side.

III. *Interval Between Zoster and Previous Irradiation.*—The time interval between the last irradiation and the onset of zoster was :—subgroup 1 : 3, 3, 3, 4, 6, 8, 9, 10, 12, 13, 13, and 16 months ; subgroup 2 : 1, 2, 3, 6, 6, 9, 9, 11, 12, 12, 15, and 20 months.

It will be seen that 19 of the 24 cases developed zoster within 12 months of irradiation, and that the peak incidence is from three to nine months. This observation is even more marked when the latent intervals in the cases of upper dorsal zoster only are examined. The figures for the 13 cases in this combined group are 1, 3, 3, 3, 3, 4, 6, 6, 9, 9, 10, 12, and 12 months. It is noteworthy that all 13 cases occurred within 12 months of irradiation.

Pendergrass notes that in his series of zoster cases the incidence was from 5 to 36 months after treatment for carcinoma of the breast (none before five months). Craver notes for seven cases of zoster after irradiation in reticulosis latent intervals of 1, 3, 6, 7, 9, 18, and 36 months after treatment. Paracchi and Pricolo note for five cases of zoster after irradiation in cancer and reticulosis latent intervals of 2, 3, 5, 21, and 48 months respectively. Greenfield and Stark, in three cases of irradiation neuropathy following seminoma testis, note latent intervals of three to five months.

For the malignant (other than breast) cases described later the latent intervals were 1, 2, 3, 4, 5, 5, 5, 5, 6, 8, 10, 18, 18, 43, and 60 months and for the non-malignant group described later 6, 6, 8, 11, 26, and 36 months after irradiation.

When all groups are added together the distribution is as follows :

Zoster Development

Months after treatment:	1	2	3	4	5	6	7	8	9	10	11	12	13–24	25–36	36+
No. of cases	3	3	7	2	5	7	1	3	4	2	2	3	9	3	3

The peak incidence in 57 cases of zoster after irradiation is seen to be at three to nine months (see Fig. 2). These figures apply to the time interval from the last treatment. In 16 instances previous irradiation was given, and in the graph the time interval from these treatments is shown separately.

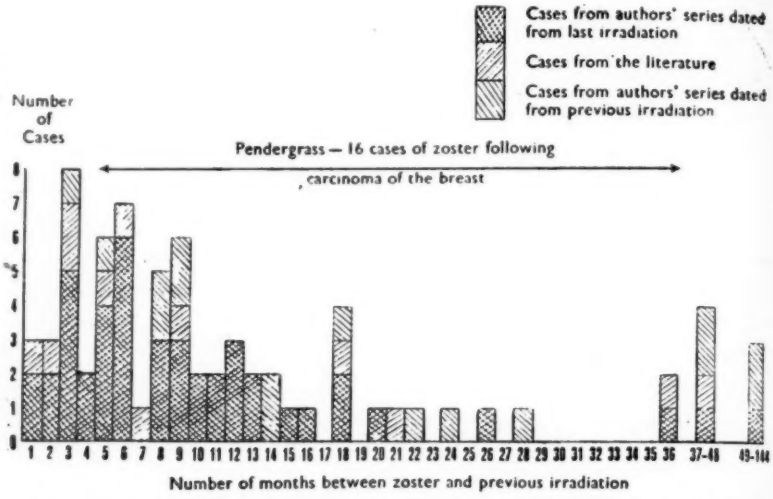
Cases from authors' series dated from last irradiation
Cases from the literature
Cases from authors' series dated from previous irradiation
Number of Cases
Pendergrass — 16 cases of zoster following carcinoma of the breast
Number of months between zoster and previous irradiation

FIG. 2.—The time interval between incidence of zoster and previous irradiation

IV. *Follow-up History.*—(1) Subgroup 1 :—In no case was there clinical evidence of spinal involvement either

TABLE III.—*Fifteen Cases of Various Malignant Diseases Treated by Irradiation*

No.	Age and Sex	Disease	Treatment	Zoster Site	Relationship to Tumour	Interval	Follow-up after Zoster	Diagnosis
A 114	56 M	Carcinoma bronchus (R)	DXR chest	Right D (upper)	Ipsilateral	14/12	Died 11/12 ? cause	Histological
		" " (L)	" "			3/12		
C 641	56 M	" "	DXR chest and lumbar spine	Right D3, 4	Contralateral	1/12	Metastases L2 1/12 before zoster. Died 1/12 metastases liver	Clinical
C 777	63 M	" " "	DXR chest	Right D9, 10	"	10/12	ISQ 2/12	"
D 605	55 M	" " "	" "	?	?	6/12	Died metastases spine with zoster	"
C 642	62 M	" " "	" "	Left D6	Ipsilateral	18/12	ISQ 2/12	Histological
D 789	69 F	Carcinoma ovary	DXR abdomen	Left L3–5	—	5/12	ISQ 3/12	Clinical
C 592	50 F	" "	" "	Left L2–3	—	18/12	ISQ 3/12	"
B 24	52 M	Teratoma L testis	" "	Right D8	Contralateral	5/12	Died 8/12 bronchopneumonia	Histological
247	51 F	Carcinoma uterus	Radium and DXR abdomen	Right D6, 7	—	60/12	ISQ 2/12	"
D 1252	83 F	Carcinoma bladder	Radium bladder	Left C5, 6	—	4/12	ISQ 2/12	Clinical
118	33 F	Carcinoma naso-pharynx	DXR nasopharynx	Left V	—	18/12	VI palsy 3/12 later; ISQ 4/12 later	Histological
			DXR L neck		—	14/12		
			DXR nasopharynx		—	5/12		
1350	18 M	Lymphosarcoma neck	DXR R and L neck	Right D2	—	43/12	ISQ 6/12	"
C 1507	74 M	Carcinoma cervical glands	DXR L neck	Left D10–12	Ipsilateral	2/12	NSR 9/12	"
O 47	60 F	Polycythaemia	DXR spleen and trunk	Left D9	—	8/12	ISQ 60/12	—
C 308	59 M	Epithelioma L forehead	Contact *x* rays	Left V	Ipsilateral	5/12	NSR 11/12	Clinical

DXR = Deep *x*-ray therapy. ISQ = *In statu quo*. NSR = No signs of recurrence.

before or after the zoster. Eight cases showed no signs of recurrence of the disease at intervals of 7, 9, 9, 10, 11, 16, 25, and 30 months after zoster (equivalent to 12, 17, 17, 20, 26, 28, 33, and 38 months after irradiation). One case developed metastases in the femur 26 months after zoster. One patient died 11 months after zoster with liver metastases. Two cases have no current follow-up record. (2) Subgroup 2:—Two cases had radiological evidence of spinal metastases, one six months and the other two years before the development of zoster. In the first case the site of the zoster has not been established, and nor could it be correlated in the second case, in which bone metastases were multiple. In the remaining 10 cases there is no evidence of spinal metastases before or after the zoster, although four patients died of metastases 1, 5, 7, and 14 months after the zoster. The remaining six patients are still alive 1, 10, 21, 24, 40, and 48 months after zoster (equivalent to 7, 19, 23, 35, 60, and 60 months after irradiation).

Malignant (Other than Breast) and Non-Malignant Cases

The 15 cases of malignant disease (Table III) vary in character and include five cases of carcinoma of the bronchus, two of carcinoma of the ovary, and one case each of lymphosarcoma of the neck, lympho-epithelioma of the nasopharynx, teratoma testis, carcinoma of the cervix, carcinoma of the bladder, secondary malignant glands of the neck, epithelioma of the forehead, and polycythaemia.

The six cases of the non-malignant group (Table IV) consist of two cases of spondylitis, two of osteoarthritis, one of syringomyelia, and one of tuberculous adenitis of the neck. Both groups are analysed together for simplicity.

I. *Site*

	Fifth Nerve	Cervical	Upper Dorsal	Lower Dorsal	Lumbar	Not Spec.	Total
Malignant ..	2	1	4	5	2	1	15
Non-malignant	—	1	—	3	1	1	6
Total ..	2	2	4	8	3	2	21

The lower dorsal region shows the maximum incidence.

II. *Side*

	Ipsilateral	Contralateral	Unspecified	Total
Malignant	4	3	8	15
Non-malignant ..	—	—	6	6

III. The interval between zoster and previous irradiation has been discussed under "carcinoma of the breast," above.

IV. *Follow-up History.*—In the malignant (other than breast) group there is evidence of spinal involvement concurrently with the zoster in one case and spinal involvement one month before the zoster in a second case. In the latter case, metastases involved L2 and the zoster involved the upper dorsal region at the level of which the patient had received deep *x* ray therapy. In the residual 13 cases there is no evidence of spinal metastases before or after the zoster, although two of these patients died at intervals of 8 and 11 months after the zoster. The 11 remaining cases were alive at intervals of 2, 2, 2, 2, 3, 3, 4, 6, 9, 11, and 60 months after the zoster (equivalent to 6, 8, 9, 11, 12, 16, 20, 21, 49, 62, and 68 months after the last irradiation). The case of the nasopharyngeal tumour with fifth-nerve zoster developed sixth-nerve palsy three months after zoster, suggesting an infiltrative basis for the zoster.

TABLE IV.—*Six Cases of Non-malignant Disease Treated by Irradiation*

No.	Age and Sex	Disease	Treatment	Site of Zoster	Interval	Follow-up
A 972	25F	Spondylitis	DXR spine	Right C5, 6	26/12	ISQ 8/12
1258	27M	" "	" "	Right D10	9/12	ISQ 36/12
			" "		6/12	(Bell's palsy 6/12 before zoster)
298	43F	Syringo-myelia	DXR cervical spine	Left D9	36/12	ISQ 24/12
A 421	43F	Tb adenitis neck	DXR L neck	D6–9	22/12	ISQ 7/12
			" "		11/12	
C 291	73F	Sacro-ileitis	DXR lower spine	?	6/12	ISQ 11/12
B 307	62F	O.A. knees	DXR both knees	Left L5, S1	8/12	ISQ 10/12

Conclusions

The analysis of our cases shows: maximal incidence of zoster at the somatic level of the neoplasm, and thus of the site of irradiation; involvement by the zoster of either the same or, to a lesser extent, the side of the body opposite to that irradiated; a maximal incidence of zoster at between three and six months following the treatment, with a gradually diminishing incidence up to two years: and no evidence of malignant involvement of the posterior-nerve root within the period of observation except possibly in four cases with vertebral involvement.

The first question to be considered is whether the irradiation may be implicated as a factor in the aetiology of zoster in these cases. We consider that the time relationship between the development of the zoster and the previous irradiation, as shown in Fig. 2, provides strong evidence that this is the case. There is some interest in the fact that late irradiation reactions in all parts of the body, associated with the relative ischaemia and fibrosis which follow endothelial proliferation, usually tend to develop at an interval of three to six months after treatment. A delayed vascular deficiency and gliosis in the spinal root ganglion or delayed fibrosis in the skin with involvement of the nerve endings might cause activation of a latent zoster virus.

The second question to be considered is the way in which the irradiation may possibly be concerned in the aetiology of herpes. In this connexion we may note (especially by consideration of the breast cancer series, where the disease is primarily unilateral that: (1) The incidence of zoster in a minority of cases is on the opposite side to that treated. (2) The level of zoster in a minority of cases does not correspond with the somatic level treated. (These two findings correspond with those of Pendergrass.) (3) One or two of the upper dorsal posterior root ganglia, on *both sides*, are sometimes directly irradiated in the routine technique for irradiation in carcinoma of the breast. Even when this is so, the zoster does not necessarily correspond in level with the posterior root ganglia irradiated. (4) The skin area (and thus the cutaneous nerves also) corresponding to the level involved by zoster later has in the majority of cases been irradiated. The technique of treatment often includes a portion of the skin on the opposite side of the midline anteriorly.

In view of our first conclusion and these observed facts, it would seem that zoster may result either from a systemic mechanism following the release of substances set free by irradiation, or possibly from an effect at the level of the cord concerned, through the afferent nerves of the irradiated area. No further speculation is justified, unless in all cases a correlation were established between the site or nerve tissue irradiated and the subsequent site of zoster. (The

necessary details for such correlation were not available in our cases, the provision of the necessary minutiae in the usual treatment notes being impracticable as a routine.)

The relative rarity of zoster in patients treated with *x* rays, even when the region of the spine is directly treated, suggests that patients vary in their sensitivity either according to the degree of fibrous reaction or according to the presence of the dormant virus. Even in a large group of cases of carcinoma of the breast treated by a similar post-operative technique the percentage developing zoster is small. A factor that may be important is that of immunity conferred by a previous attack of zoster or varicella. On the other hand, zoster developing after a prolonged period after irradiation—e.g., more than 24 months later—is likely to be purely coincidental.

Previous attempts to correlate zoster with cancer or reticulosis have been based on the hypothesis that the zoster was due to infiltration by the underlying disease of the spinal ganglia or other parts of the afferent nervous reflex arc. No other authors seem to have correlated the incidence of zoster with the administration of *x*-ray treatment in a large series where such infiltration was absent.

Summary

A series of 45 cases of zoster developing after irradiation is described.

The literature concerning the connexion between zoster on the one hand and malignant disease and reticulosis on the other is reviewed. Evidence is adduced to suggest that irradiation is implicated in the development of zoster in the majority of the cases described.

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According to the specification for stretchers recently published by the British Standards Institution the overall length of stretchers should be 7 ft. 9 in., though these requirements need not interfere with the use of 6-ft. stretchers to meet special needs, since the shorter stretchers can still be carried in ambulances designed to take those of full length. The institution recommends that stretchers should be held in position in ambulances by straps provided with buckles instead of by special locking devices, which are not universally applicable. Stretcher carriers and trolleys have also been specified. The British Standards Institution is a non-profit-making organization which was founded in 1901 and incorporated by Royal Charter in 1929. Its principal objects are to improve and simplify production and distribution. Organizations that co-operate with it include the Medical Research Council, various trade associations, and some of the Ministries. The B.M.A. is represented on the committee which prepared the standard for stretchers.

MALE SUBFERTILITY

INTERIM REPORT OF 3,182 CASES

BY

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This report contains a survey of the findings of an investigation into male subfertility carried out at the laboratories of the Family Planning Association over a period of four years. Nothing essentially new is presented, but the general information provided by a comparatively large amount of material may be of interest.

Material

Altogether 3,182 men were examined, with a total of 5,400 semen analyses. The patients were referred by hospitals, subfertility clinics, private consultants, and general practitioners. Most of them are the husbands of wives who had failed to conceive over an average period of about two years. In many cases the wives had been examined first and no gross subfertility factor had been found. In over 800 of these the initial post-coital examination was made in this laboratory and an unsatisfactory result was found. In over 180 cases conception had occurred in the past but had terminated in early spontaneous abortion. Thus it is obvious that the material is selected. The findings in a separate group of 15 normally fertile men are included in this report.

Methods

The technique of semen examination corresponds in almost every detail to that described by Harvey and Jackson (1945). A brief recapitulation of these methods may be helpful.

Collection of Seminal Specimens.—After a minimum period of abstinence of three to four days the specimen is produced direct into a clean thin-walled glass container previously warmed to body temperature by the hand or axilla. The specimen tube is closed with a paraffin-impregnated cork, wrapped in cellulose wadding, and brought to the laboratory as soon as possible. The maximum delay allowed is two hours, and the age of most specimens in this series was well below this. About one-third of the patients produce their specimens at the laboratory. Condom specimens are not accepted except for confirmatory tests in cases of total azoospermia or extreme oligozoospermia. Fresh specimens are allowed 20 to 30 minutes for liquefaction.

Semen Analysis

On receipt of the specimen the volume is measured and a note made of its consistence.

Density, Basic Motility, Viability.—A "bulk" dilution is prepared by adding 0.5 ml. of semen to the required amount of a buffered glucose solution at 37° C. The dilution and all pipettes and slides are kept in the incubator at body temperature. After one hour's incubation a drop of diluted semen is placed on a Thoma-Zeiss haemocytometer slide and allowed to sediment for five minutes. The count is done in two stages: (1) immotile and sluggish spermatozoa are counted, active ones are disregarded; and (2) all spermatozoa are immobilized by brief application of heat to the cover-slip and counted after further sedimentation. (This is a modification of Harvey and Jackson's technique, in which the two stages of counting are done on separate haemocytometer slides: on one of them the spermatozoa are immobilized immediately by exposure to osmic acid vapour. Repeated cross-checking has shown that these

methods give similar results.) From count 2 the sperm density is calculated, and by subtracting count 1 from count 2 the number of fully active spermatozoa is obtained. The motility found after one hour's incubation is called the basic motility of the specimen. Viability figures and a check on the density are provided by repeating the process after three and five hours' incubation.

No reliance is placed upon the observer's capacity to estimate the number of motile or immotile spermatozoa in a given field, but accurate counts of stationary spermatozoa are taken throughout.

Morphology.—A smear of semen is exposed to osmic acid vapour, fixed in Schaudinn's fluid, and stained with Weigert's haematoxylin and Rose Bengal. The smear is not allowed to dry at any stage of the process. It is finally embedded in Canada balsam and kept for reference. For routine purposes a differential count is taken of two groups of 100 spermatozoa each on opposite parts of the slide. Leucocytes and other cells are also counted. A report is sent to the patient's doctor recording the age of the specimen, period of abstinence preceding the test, the volume in millilitres, density in millions of spermatozoa per ml., motility in percentages of "active" and "sluggish" after one, three, and five hours' incubation, morphology in percentages of (*a*) head and (*b*) middle-piece and tail abnormalities, and, finally, a verdict classifying the specimen as "normally fertile," "borderline," or "subfertile." All features of the semen analysis are taken together in assessing the quality.

Repeat Tests.—A second specimen is invariably asked for in the following cases. (*a*) Total azoospermia. The need for this precaution became apparent when one of our patients produced 3.5 ml. of semen containing no spermatozoa or testicular elements, and three weeks later his specimen contained 30 million spermatozoa per ml. He had had no treatment in the interval, and both specimens had been produced at the laboratory. I have since heard of another similar case. (*b*) Poor motility, or absence of motility, in a specimen showing any but the grossest abnormalities in other respects. The motility of spermatozoa is the feature most easily influenced by extraneous factors (excessive age of specimen, faulty collection or transport, contamination), and so-called asthenozoospermia in a specimen of otherwise reasonable quality is very much rarer than its diagnosis. (*c*) A volume so small as to suggest an incomplete ejaculate. Whenever possible a second specimen is also examined before returning a verdict of subfertility, as it has been found that for no apparent reason normally fertile men occasionally produce unsatisfactory specimens.

Interpretation of Semen Findings

It is necessary to discuss in some detail the criteria we have used in assessing the quality of seminal specimens, for it must be admitted that no reliable figures exist which define the limits of normal fertility. Figures used by different workers vary a good deal, and apart from discrepancies attributable to different seminological techniques it is not usually stated by what criteria a man is classified as normally fertile.

Unfortunately the task of establishing the limits of normal semen findings is complicated by the fact that a couple's fertility depends upon both partners; certain types of semen defect can be compensated for by particularly favourable conditions of coital technique, of "timing" in relation to ovulation, and by a high degree of fertility in the wife. This means that a man whose semen has to be labelled "subfertile" may produce pregnancies under exceptionally favourable circumstances, whereas under average conditions the marriage might remain sterile.

It would seem futile to attempt research into male subfertility without the background of a normal range of values. It was decided, therefore, to collect semen analyses of men who might be considered to be above suspicion. The following conditions were postulated for inclusion in this group: (1) their wives should have had at least two full-term pregnancies, each resulting in the birth of a normal live child; (2) pregnancy should not have been delayed for more than one year from the time when it was first attempted; (3) the youngest child should not be more than 1 year old; and (4) there should be no history of miscarriage.

Unfortunately the various sources approached have provided only 15 such cases in three years. It is hoped that increasing interest in the subject may produce adequate co-operation in the future and enable us to complete the group of 200 originally envisaged. There should be no dearth of material in the post-natal clinics and centres advising on birth control.

Meanwhile it was decided to include this small series in the interim report, and to add to it the information obtained from 125 men whose wives conceived soon after the routine semen tests. I do not claim, however, that the criteria for the interpretation of semen findings are based upon statistically adequate material, and these figures are used only as a temporary expedient subject to confirmation.

The minimum "normal" figures used by this laboratory in assessing the quality of seminal specimens are as follows:

Volume	1.5 ml.
Density	40 millions per ml.
Basic motility ..	40–50%.
Morphology ..	Total abnormalities not to exceed 40%, head abnormalities not to exceed 25%.
Viability	The motility of the five-hour count should not be less than half the basic motility.
Leucocytes and other cells	Not more than 2 millions per ml.

Findings on which Minimum Normal Values are Based

Group A.—This consisted of 15 normally fertile men. The details collected are shown in Table I.

TABLE I

	Range	Average
Volume	1–11·2 ml.	3·8 ml.
Density	52–670 millions/ml.	143 millions/ml.
Total ejaculate	68–804 millions	395 millions
Basic motility	17–62%	39%
Morphological abnormalities:		
Total	16–35%	25%
Abnormal heads only ..	6–15%	10%

Group B.—This comprised 125 men who were sent for routine investigation and who are known to have produced pregnancies subsequently. In 104 cases the date of the wife's last menstrual period was obtained and the interval between the last test and conception was found to be 1–3 months in 75 cases, 3–6 months in 25, and 6–12 months in eight. No information is available whether the husbands were treated in this interval. However, it is doubtful whether this would have made much difference, because in more than half the cases the time would have been too short even for effective treatment to influence the semen picture materially, and because most of the methods of treatment in common use are ineffective. The figures collected are given in Table II.

Discussion of Groups A and B.—No marked discrepancy was found in the range of volume, density, total ejaculate, and motility of the specimens in these two groups. However, it will be noted that whereas in Group A the average incidence of morphological abnormalities was 25% and did not exceed 35%, in 21 cases of Group B the figure exceeded 40%, and in 22 even 50%. This may be partly explained

TABLE II

Volume in ml.						
Range	Under 1·5	1·5–3	3–5	5–8	Over 8
No. of cases ..	4 (3·2%)	48 (38·4%)	48 (38·4%)	22 (17·6%)	3 (2·4%)

Density in millions per ml.						
Range	Under 5	5–20	20–50	50–100	100–200	Over 200
No. of cases	3 (2·4%)	11 (8·8%)	21 (16·8%)	46 (36·8%)	33 (26·4%)	11 (8·8%)

Total Ejaculate in millions of Spermatozoa						
Range	Under 15	15–60	60–150	150–300	300–600	Over 600
No. of cases	4 (3·2%)	10 (8%)	21 (16·8%)	39 (31·2%)	38 (30·4%)	13 (10·4%)

Basic Motility %						
Range	Under 20	20–40	40–60	60–70	Over 70
No. of cases ..	15 (12%)	57 (45·6%)	45 (36%)	7 (5·6%)	1 (0·8%)

Morphology: Total Abnormalities %						
Range	Under 10	10–20	20–30	30–40	40–50	Over 50
No. of cases	1 (0·8%)	6 (4·8%)	36 (28·8%)	39 (31·2%)	21 (16·8%)	22 (17·6%)

by the fact that the 125 pregnancies include a number which ended in early abortion. From evidence so far acquired I believe that pregnancy produced by morphologically unsatisfactory semen carries a distinctly increased risk of ending in early abortion. For the time being this can be put forward only as an opinion awaiting confirmation. A series of such cases is being collected and the findings will be published as soon as an adequate group of "normals" has been examined.

Findings in Routine Semen Tests

In 5,400 semen analyses of 3,182 men we found that 791 (24.8%) were normally fertile; 423 (13.3%) borderline; 1,711 (53.8%) distinctly subfertile; and 257 (8.1%) had total azoospermia. Although, as pointed out above, these figures do not represent an average sample of the population, they demonstrate the very substantial part played by male subfertility in the barren marriage.

The wives of many men in the "distinctly subfertile" and even "total azoospermia" groups had previously been subjected to prolonged investigations, and frequently attempts had been made to help matters by dilatation and curettage, ventrosuspension of the uterus, and a variety of hormone administrations. One childless woman had had two "D. and C." operations, a tubal insufflation, a salpingogram, an endometrial biopsy, and a host of injections, tablets, and douches, extending over a period of two years and costing a considerable sum, before someone thought of examining her husband. His semen contained no spermatozoa on repeated examination.

Some Common Fallacies

A considerable number of patients referred to this laboratory reported that previous attempts to investigate and treat their condition had been made and that often these had failed to clarify the situation or to improve matters. Certain types of mistakes were encountered so constantly that their discussion would seem desirable. As a rule the failure is accounted for by inadequate seminological technique.

Condom Specimens

For several years seminologists have been unanimous in condemning the examination of condom specimens for routine fertility assays. The rubber of condoms is known to contain substances injurious to spermatozoa, which may immobilize them quite rapidly. Nevertheless, even at the present time several laboratories accept such specimens and give reports on them. In some cases condoms are sent by post overnight.

It cannot be too emphatically stated that a specimen collected under such conditions cannot possibly show normal features, and that any verdict on the quality of such a specimen—except that of total azoospermia—is bound to be mere guesswork. The motility of spermatozoa is one of the most important indices of their quality, and distinctly poor motility on repeated examinations would brand a specimen as subfertile no matter how good the other features might be.

Two patients whose semen showed normal volume, density, and morphology but persistently low motility figures (1–4%) had previously been pronounced highly fertile on the evidence of condom specimens. No impairment had been found in their wives, and their marriages remained barren after four and seven years' trial.

Direct Microscopical Examination of Semen

Sometimes a patient will answer the request for a seminal specimen by saying that his doctor had looked at his semen under the microscope and found him "perfectly all right." Sometimes the semen was taken from a condom. This method is approximately as accurate as a blood picture obtained by direct microscopical examination of a more or less fresh drop of blood. In my opinion any attempt to short cut a complete semen analysis is bound to delay the discovery of the cause of a couple's failure.

Minimum Normal Findings

Density.—It is often argued that, theoretically at least, the presence of only one spermatozoon in a man's ejaculate makes him a potential father. On the other hand, a patient recently brought a report from his local hospital stating that he was sterile, as his semen contained only 8 million spermatozoa—a quite unjustifiable prognosis. It is alarming to speculate on the possible consequences of such a statement. In my series of 125 pregnancies the minimum densities are: 1½ millions before and after conception in one case, and three-quarters of a million before and 1½ millions after conception in another. In 11 other men of this group the densities ranged from 5 to 16 millions before conception, but subsequent specimens were not obtainable. Harvey and Jackson (1948) report pregnancies with repeated counts as low as 1 million. Whereas such semen findings obviously cannot be taken to indicate normal fertility—i.e., an average expectation of pregnancy—it would seem equally unwise to tell a man suffering from oligozoospermia either that he is sterile or that he needs no help.

Motility.—It is not uncommon to find that a patient has been subjected to prolonged treatment because "his spermatozoa are weak" whilst in other respects the semen is said to be normal. Usually this verdict is based on findings in a condom specimen or on one several hours old. In my experience true asthenozoospermia—i.e., poor motility without gross impairment of other features, especially morphology—is uncommon. I have records of only four men whose semen showed normal volume, density, and morphology but whose sperm motility remained persistently between 1 and 8%. Between five and eight semen tests were done in each case over a period of one to three years, and most specimens were produced at the laboratory. Two of these cases were quoted above as having been classified "highly fertile" on condom specimens.

At the other extreme, I have seen many semen analyses reporting 90% or even 100% motility. Several laboratories dealing with routine semen examinations put 80% motility as the lowest figure compatible with normal fertility. So far as I am aware, the technique of the motility count in these instances consists in counting both motile and immotile spermatozoa in a number of restricted microscopical fields

"Pregnancy" groups A and B (see above) show a maximum motility figure of 62% in the former, and only one of the 125 cases in the latter exceeded the 70% limit. Among the remainder of the material I have occasionally found motility figures approaching the 80% mark, and in one case even exceeding it. However, these are exceptional cases, and I feel that 50% can be regarded as fully adequate.

It might be argued that the discrepancy between our findings and those of other workers is simply due to a difference in technique, and that, provided each keeps to his standards, results can still be reliable. However, I suggest that it is undesirable to rely upon a method which can produce variable results even with the same observer, and which in the past has produced most unlikely findings.

The ultimate purpose of semen examinations is not only to diagnose possible defects, but also to provide reliable indications of the patient's progress under treatment. This requires strictly comparable results from one test to the next.

Morphology

Comparable to the motility figures quoted above, the same reports are often found to record findings of 90 or 100% normal spermatozoa, and the minimum figure indicating normal fertility is stated to be 80% of normal forms. The 15 normally fertile men (group A) show a range of 16–35% of morphological abnormalities, and 60% of group B have 20–40% of abnormal spermatozoa.

Many excellent descriptions and illustrations of the various types of abnormal spermatozoa have been published. It is difficult to understand how different observers can disagree in deciding whether, say, a sperm head has a normal oval outline or is deformed; whether there is a well-marked division between the clear anterior and the darkly staining nuclear half of the head or whether it is just a pyknotic mass; whether a "collar" of cytoplasmic material surrounds the middle piece; or whether this is straight or bent—to mention only a few common and obvious features.

The following case will illustrate the practical importance of what might be regarded as an academic point.

A patient presented himself with an unusual semen condition encountered by me in only two other cases. In a specimen of normal volume and good density 98% of the sperm heads were small, spherical, and pyknotic, and more than half of them were surrounded by cytoplasm—i.e., they presented the appearance of degenerate spermatids—and the motility was poor. Yet the same patient brought two previous semen reports from a hospital running a large subfertility clinic pronouncing him normally fertile. A slide of one of his previous specimens generously loaned to us showed the same grossly abnormal features.

Furthermore, I believe that pregnancy produced by a specimen showing impaired morphology carries an increased risk of early abortion; and, whether to prove or disprove this contention, it is obviously desirable to pay the utmost attention to accurate differential counts.

The above descriptions refer only to the commonest sources of error encountered. But over and above these there are many more disagreements amongst laboratory workers and clinicians. They all tend to vitiate the attempts to provide an accurate diagnosis on which rational prognosis and treatment could be based. It is necessary to emphasize the fact that the examination of semen requires adequate time and a highly specialized technique, and that there is an urgent need for standardization of methods if our past neglect of the subfertile male is to be remedied.

Treatment

I shall discuss in some detail only two substances in common use on which the material examined has enabled me to form an opinion—namely, vitamin E and testosterone. Research is still in progress upon other methods of treatment, and it is intended to publish the results in a future report.

Vitamin E.—Forty-two unselected subfertile men, excluding only cases of azoospermia, were treated with "ephynal," a synthetic analogue of vitamin E. The doses given were from 10 to 40 mg. daily over a period of from 6 to 24 weeks. Six cases showed some improvement, seven showed some deterioration, and 29 were unchanged. Five cases in this group received additional doses of 5 mg. of methyl testosterone on alternate days at one time during the above treatment, and they were all in the "unchanged" group at the end. Subsequently, 34 cases treated with corresponding doses of natural vitamin E ("fertilol") for periods of six to ten weeks showed similar inconclusive results; the series was abandoned at this stage. Although I am not in a position to deny that more prolonged treatment—one to two years has been suggested—might not prove of some value, I do not feel justified in advocating vitamin-E therapy on the evidence available. The above figures, in my opinion, could be found in a similar untreated group Detailed figures of the "ephynal" group are published in the *Proceedings* of the Family Planning Association Conference on Infertility held at Exeter in 1948.

Testosterone.—Fifty-three unselected subfertile men, again excluding cases of total azoospermia, were given methyl testosterone in doses ranging from 5 mg. on alternate days (21 cases) to 10 mg. a day over periods of from four to eight weeks. Two cases improved, 18 (mostly reduced density) deteriorated, and 33 were unchanged. In addition to this group many cases sent to me for examination have been treated with testosterone elsewhere and sent back for re-examination. They received doses similar to the above, or injections of testosterone propionate in doses of 10–25 mg. once or twice a week, for periods up to 12 weeks, or testosterone implants. The only fairly constant effect of the larger doses, and occasionally of the lower ones, on the semen picture is a reduction of sperm density. As a rule this effect is only temporary, and, even if it is alarming to see a case of oligozoospermia reduced to azoospermia, the semen picture can usually be expected to resume its original level a few weeks after the cessation of treatment. I consider that testosterone has no place in the treatment of semen deficiencies. However, provided the dose is not excessive, some cases might benefit from the temporary increase of libido it often produces.

Treatment with the gonadotrophins would still seem to hold out some hope, but reliable figures are not yet available.

Selection of Cases for Treatment

If it is difficult to assure the patient that any form of treatment will benefit him eventually, present-day methods of investigation can produce at least two definite and useful results: first, from the beginning to exclude from treatment those men whose fertility is damaged beyond repair; and, secondly, to eliminate those forms of treatment which are certain to prove useless in a given case.

The above refers mainly to cases of total azoospermia and oligozoospermia, and I consider it unwise to attempt treatment in such cases without first performing a testicular biopsy A biopsy is a minor operation which can be performed in a few minutes at the consulting-room, clinic, or out-patient department, and leaves the patient fit to return to work next day. It is an essential step in deciding whether a case of azoospermia is due to blockage of the epididymides or vasa, or to failure of spermatogenesis. In the former case only surgical treatment is likely to help: in the latter, either absence of spermatogenic cells will prove the patient hopeless or the finding of incomplete maturation may hold out some hope of stimulating the process Again,

in a case of oligozoospermia the presence of a few fully active seminiferous tubules with complete inactivity in the remainder indicates little prospect of improvement, whereas if most tubules are found to be active, but at a reduced rate, treatment is well worth trying.

Only 128 biopsies have been performed at this laboratory to date, and if nothing has been achieved beyond the fact that 27 patients could confidently be advised to abandon treatment, I feel amply repaid by the considerable time and expense thus saved.

The subject of testicular histology and its correlation with semen findings and with the effects of treatment is likely to prove of the greatest importance. It is mentioned here only briefly, as material is being collected for a more detailed report.

Summary

A survey is made of the semen findings in 3,182 male partners of subfertile marriages, 125 of whom produced pregnancies subsequently. A separate group of 15 selected normally fertile men is described. Cases are quoted illustrating the need for adequate investigation of the male and for standardization of seminological technique.

I am indebted to Roche Products Ltd., Vitamins Ltd., Ciba Laboratories Ltd., and Organon Laboratories Ltd for the generous free supply of their products for our experimental series.

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THUMB RECONSTRUCTION BY TRANSFER OF BIG TOE

BY

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This is an interim report on the treatment of a patient whose lost thumb we have restored by a method seldom used, and one not everywhere held in good repute. Nevertheless we believe the method has advantages which should be seriously considered in cases in which restoration of a missing thumb or finger is thought to be desirable.

Nicoladoni (1900) introduced the method in 1898, and he reported an instance of successful tendon function when a toe had been used to replace an injured thumb. Gueullette (1930) reported from the literature 12 instances of the transfer of the big toe and five of the use of the second toe: there were only three good results. Five of the toes necrosed and the remainder were stiff and useless (quoted by Bunnell, 1949). We can find no record of the use of the method in this country until 1947, when J. B. Cuthbert demonstrated a successful result in a man at the Plastic Centre at Rooksdown House, Basingstoke. Cuthbert stressed the fact that selection of this method depends on the size of the big toe. A massive bulky toe is of little use because of its unpleasant appearance. Bunnell, in condemning the method, writes: "The second toe is too narrow and weak and the great toe is too gross." He draws attention to the disappointing results up to 1930, but states that he has seen one case successfully operated on by H. Hoyle Campbell, in which suture of the digital nerves had been followed by some return of sensation but without stereognosis.

The possibilities of a successful nerve suture, restoring cutaneous sensibility, and the maintenance of motion in the transferred interphalangeal joint make the method attractive. A point of great importance with many of the younger patients, particularly girls, is the appearance of the new thumb. To look well, a repaired digit must have a nail of appropriate length and skin of colour and texture approaching the normal. Other methods of reconstruction will cater for length and, to some extent, skin texture, but only by digital transfer can a nail be restored.

Unless the new thumb is elegant and functional the patient will develop "cover-up" mechanisms and will avoid use of the laboriously produced digit, which is often of more satisfaction to the surgeon than either function or appearance can justify.

Case Report

The patient was a girl aged 9. When 2 years old she fell on to an electric fire and burnt both her hands. The burning was so severe that all the digits of the left hand were destroyed. The burns of the right hand were less severe, but there was sufficient scarring and ankylosis to impair function.

Fig. 1 shows the condition of her left hand at the age of 3, in 1942. The maximum loss is in the index finger and thumb, only the epiphyses of the proximal phalanges remaining. The middle finger is represented by most of the shaft of the proximal phalanx, and the fourth and fifth fingers have been similarly destroyed.

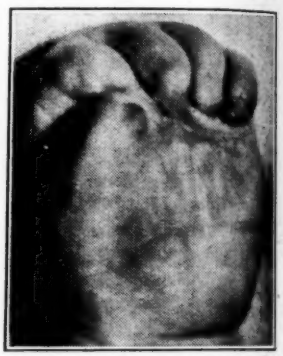

FIG. 1.—The hand at 3 years of age. Only the stump of the proximal phalanx of the thumb remains. The stumps of the medial four digits are bound to the palm. At this stage the complete palm was replaced by a dermatome graft and the digital stumps mobilized by Sir Harold Gillies.

When the child was 3 Sir Harold Gillies replaced the palmar scar by a dermatome graft. Later he deepened the first cleft by a large dorsal rotation flap with a free skin graft to the secondary defect. These operations were completely successful.

Six years later it was clear that the child could not develop a proper pick-up mechanism between the thumb stump and any digit, as the thumb stump was too short to be opposed even to the longest finger stump. Choice of this method of repair was suggested by Sir Harold Gillies, in the light of Cuthbert's case, because of the age and sex of the patient, and was influenced by the fact that her big toes were neat and not bulky. The tactics of the surgical campaign were explained to the parents so far as was possible, also the discomfort to be borne and the fact that the method was one that had seldom been used. The foot on the same side was chosen, as the hand can comfortably lie on the foot on the proper axis with less strain. The digits of both hand and foot lie parallel, and zinc oxide strapping ensures adequate fixation. The technique of the operation is described below.

Subsequently the transposed toe was shortened, with obliteration of the volar groove. The cleft between the middle and index fingers was deepened to increase their active length and aid the development of a pick-up mechanism. The extensor tendons of the thumb and transposed hallux were joined. Figs. 2, 3, 4, 5, and 6 show the appearance and condition of the hand.

FIG. 2.—The attachment. The hand is shown inserted underneath the dorsal flap. This photograph was taken a month after the attachment.

Suture of the digital nerves has yet to be done, but an appreciation of deep pressure returned to the pulp three months after operation. After 10 months there was some appreciation of pin-prick all over the pulp. Appreciation of deep pressure, which is present everywhere in the pulp, may possibly be referred from the stump of the true thumb.

The patient already has the ability to pick up and hold fairly bulky objects, such as a pencil or a fork (Fig. 5), but is handicapped by the instability of the union between graft and host. Although stability is increasing it is almost certain that a bone graft will be necessary to produce union between the phalangeal fragments. At a very much later stage it may be practical to do a flexor tendon transplant or graft.

FIG. 3.—The big toe on the hand immediately after being detached from the foot. It is too long, too thick, and there is a deep volar groove.

The colour of the new thumb is more pink than a normal one, but there is a brisk capillary response to pressure. The pulp of the toe has shrunk since transfer, and this reduction in overall bulk has improved the cosmetic appearance and produced a thumb nearer to normal size. Further thinning by surgery may yet be desirable, and is certainly practicable.

The stump of the toe on the foot is soundly healed and stable; the patient runs, dances, and plays hockey without disability.

Technique of Toe-Thumb Transfer

Method of Attachment.—In order to get a broad attachment of raw surfaces, such as may be expected to nourish the toe when its digital vessels are divided, a large dorsal flap is necessary. This must be hinged distally, and for safety is therefore best delayed. A circular flap (Fig. 7), about 8 cm. in diameter and leaving the proximal and distal pedicles of 4 cm. intact, was elevated and then sutured back in position (a bigger and broader flap would have permitted the transfer of two or more toes). For the next two weeks the patient practised maintaining for increasing periods the posture that was to be necessary during the period of attachment. At operation the proximal pedicle was divided and the flap elevated up to its distal pedicle at the base of the big toe. The proximal phalanx of the big toe was divided through the middle of its shaft. The extensor hallucis longus was divided about 10 cm. from its distal attachment. The raw area on the dorsum of the foot was covered with a hand-cut split-skin graft. The scar on the thumb stump and an area of dorsal skin smaller than the foot flap were excised. This stump with its dorsal raw area was then inserted under the foot flap. The extensor hallucis tendon was sutured proximally under the dorsal thumb-skin. The foot flap was sutured to the margins of the thumb defect by interrupted fine serum-proof silk sutures.

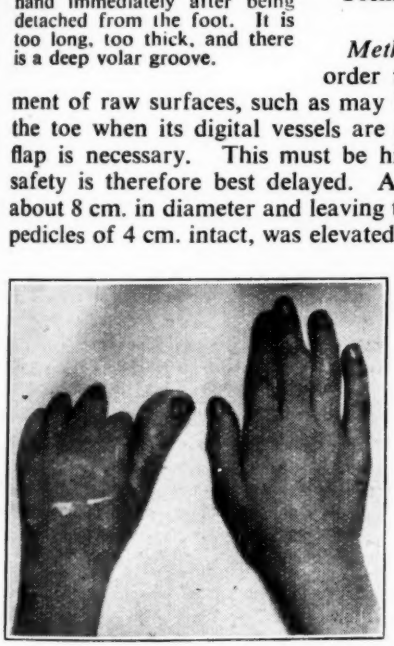

FIG. 4.—Photograph of the two hands eight months after the transfer, but before elongation of the third digit by deepening its webs.

FIG. 5.—The pick-up mechanism present between the third digit and the reconstructed thumb ten months after operation.

Period of Attachment.—Zinc oxide strapping fixation between hand and foot was used. It was not completely effective, and some detachment on the lateral side of the flap occurred. For this reason the period of attachment of the hand to the foot was increased from four to six weeks. The posture caused continuous discomfort and pain for the first three or four days, during which time morphine was often necessary. Subsequently massage and changes in posture controlled most of the discomfort.

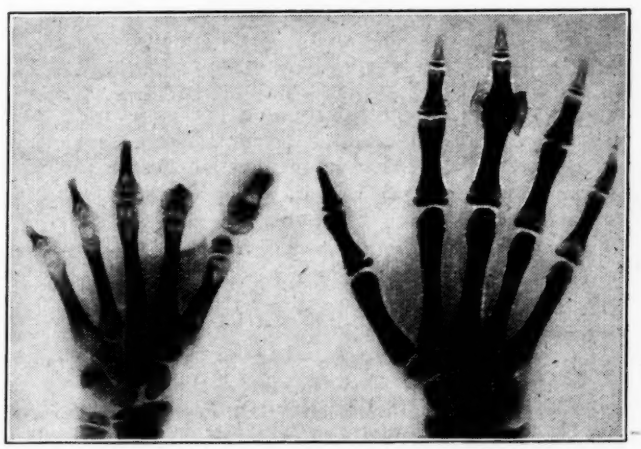

FIG. 6.—Radiograph eight months after the transfer of hallux to base of thumb. The new digit is decalcified compared with the bones of the right hand, but not so much in comparison with the phalangeal stumps on the same side. There is a gap between toe and thumb phalangeal fragments which is to be filled with a bone graft.

Method of Division.—At two weeks the medial digital nerve and vessels of the hallux were divided, and at four weeks the lateral vessels and nerve. It would have been better if the nerves had been divided

FIG. 7.—Diagram to show proportions of delayed flap (width of flap 8 cm. at widest point). In a subsequent case of complete adactyly at present under treatment a dorsal flap comprising the skin and subcutaneous tissues of the dorsum of the foot from 3 in. (7.5 cm.) proximal to the bases of the toes has been used.

well proximally, as the extra length so obtained would facilitate suture with the thumb digital nerves. At six weeks the remaining volar attachment of the toe and the flexor tendon were divided. The toe stump was covered with a split-skin graft, and some split skin was also spread on the volar defect of the thumb at the level of the attachment. Healing of thumb and foot was complete two weeks later.

Discussion

There are good points and bad points about all current methods of thumb reconstruction or elongation—that is, about pollicization of index, abdominal tubed pedicle plus bone graft, phalangization, and the Gillies "chapeau flap" with bone graft.

A successfully pollicized index, having full mobility and sensation, gives much the best functional result, but the appearance is that of a lobster claw and can be grotesque. Furthermore, in our experience a pollicized index has tended with time to fall back into its original plane flush with the other three digits. For these reasons the method may not appeal for certain cases, particularly young female patients.

An opposition post made of a tube pedicle plus bone graft is rigid unless borne on a mobile metacarpal stump. Its sensation remains poor and is always lacking in stereognosis. It is often of very poor appearance, and increasing mobility of the abdominal skin on the bone graft interferes with its usefulness as a gripping mechanism. It is, nevertheless, the alternative method of choice for adult males when, owing to loss of other digits, pollicization cannot be done.

In partial losses the thumb may have its apparent length increased and its function improved by deepening the first web—that is, the operation called by Bunnell "phalangization." The method is a useful one for cases with substantial remnants of the proximal phalanx.

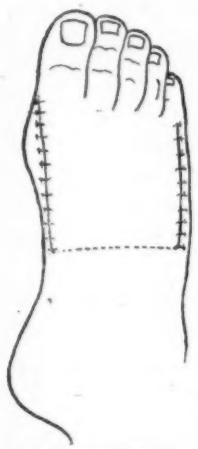

FIG. 8.—Diagram to show delayed dorsal flap used for transfer of five toes (in a case of congenital adactyly at present under treatment). The flap is elevated between two parallel incisions. After an interval of at least two weeks it is divided along the dotted line and elevated again up to the base of the toes. This large flap gives additional security to the pedo-carpal transfer.

The Gillies "chapeau flap," by which an additional 1 in. (2.5 cm.) may be added to a thumb stump, is an alternative method for similar cases. The flap contains most of the skin of the thumb stump and is based distally on the lateral side of the first web—a precarious attachment and one best delayed. When the flap is elevated and displaced distally, a 1-in. bone graft is inserted under it into the phalangeal stump to elongate it. A free skin graft covers the proximal secondary defect. A considerable return of sensation occurs in these stumps, as the repair is by hand skin which has touch corpuscles. This repair is most suitable for adult males, but it makes no attempt at restoration of normal appearance or of interphalangeal movement in the thumb.

It is reasonable to suggest, in view of the limitations of other methods of thumb repair in spite of their value, that the advantages of a hallux-thumb transfer should be given more consideration. This holds particularly for the young, who stand the posture best and who suffer most psychologically from the appearance of a missing digit or an ugly repair. The three cases (of which one is reported here) done in this country are known to have been successful. In the third case (Fig. 8), where all five toes have been transferred to the hand, all the transferred digits are viable (case under treatment at the moment). Previous experience (Gueullette) has probably exaggerated the hazards of the method.

Adactyly.—The method would seem to be of special value for trial in congenital absence of all digits. There are no greater surgical difficulties in transferring five toes than in transferring one—indeed, the dorsal flap for five toes is larger and therefore safer (Fig. 8). The toes with their nails provide the only repair which can give a reasonable match to normal fingers for these difficult and distressing cases.

It is a pleasure to acknowledge our thanks to Sir Harold Gillies, who referred this case to us both with the suggestion that we adopt this method and with much valuable advice on how it could best be done.

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Medical Memoranda

Prolapsed Intervertebral Disk After Lumbar Puncture

It would seem from the increasing number of cases of prolapse of the disk with a history of symptoms beginning after lumbar puncture that this hazard of the procedure is more common than is generally accepted. The case described below illustrates the normal sequence of events where damage has occurred to the disk. The condition was finally cured by operation, the laminectomy findings being in support of a possible rupture of the disk by a needle.

CASE REPORT

The patient, a young man aged 22, stated that he had had trouble with his back since November, 1945. At this time he was given spinal analgesia in a military hospital in order to carry out a radical cure of an inguinal hernia. Unfortunately this analgesia was unsuccessful, and, furthermore, while the needle was being inserted he felt a sudden sharp pain down the sides of both legs and they shot out into the extended position quite involuntarily. It is interesting to note that this was followed by a spinal headache for as long as 14 days after the operation. From that time he developed attacks of backache which could be brought on by such minor trauma as jumping down from a lorry.

When seen in the orthopaedic department of the Coventry and Warwickshire Hospital he was suffering from left-sided sciatic pain extending down the outer side of the thigh and into the ankle, which he had had for three months. This was the first attack of sciatica that he had experienced.

On examination he was found to have a slight degree of scoliosis convex to the left, which he stated had been much worse. Forward flexion of the spine was grossly diminished, but lateral flexion was fairly free. There was no evidence of disturbance of sensation or reflexes of the limbs. A radiograph of the lumbar spine showed a narrowing of the disk space between L4 and 5. It was decided to explore the above disk space, and the patient was admitted to hospital.

Laminectomy was carried out by Mr. N. W. Nisbet. The laminae of L4 and 5 on the left side were exposed and the ligamentum subflavum was removed. The dura was found to be pulsating but bulging. On retraction of the dura and the fifth lumbar nerve root medially a very marked protrusion of the intervertebral disk could be seen. This had obviously been producing pressure on the fifth root. Almost immediately the protrusion had been displayed disk material began to exude into the space behind the dura in a manner similar to the exudation of sebaceous material from the minute aperture in a sebaceous cyst. The whole of the disk material was removed in the usual manner.

Post-operative progress was uneventful, the patient's sciatic symptoms being completely relieved, although he complained of some coldness of the left foot. There was no evidence of any sensory disturbance.

There seems to be little doubt that this disk lesion was the direct result of a puncture of the annulus fibrosus of the intervertebral disk. The exudation of nuclear contents through a small aperture supports this causation.

I am indebted to Mr N W Nisbet for permission to publish this case.

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A Case of Human Myiasis

While acting as medical officer in charge of a German P.O.W. working camp in Buckinghamshire I saw a case of human myiasis. As this is unusual in England the case history seems to be worth recording.

CASE REPORT

The patient, a 27-year-old German P.O.W., had had a radical operation for left otitis media in 1940. He said there had always been a purulent discharge from the left ear since, combined with vertigo on thermic irritation. The patient was seen by British and German E.N.T. specialists, who recommended various kinds of treatment, but without any effect on the discharge. The ear was cleaned and iodine powder 1% insufflated regularly.

In the summer of 1947 he had an open-air job at a brickworks in a rural district. Late in September, 1947, he reported sick, complaining of intensified trouble with his left ear, a feeling of pressure, and some pain of two days' duration. There was also a slight discharge of pink-coloured matter.

Examination with the auriscope revealed the following picture. In the external meatus there were some larvae (obviously belonging to a kind of fly) moving in a lively manner. The interior parts—i.e., the former tympanic cavity—were filled completely by a moving mass. It was a solid block of larvae lying parallel and swimming in a pink serous fluid; the heads of the maggots were directed to the inner ear and only the bigger tails were visible.

As I knew the "normal" state of this ear very well and as a removal of all the larvae by means of forceps seemed to be impossible, I tried very cautious rinsing with normal saline. At first the larvae were removed quite easily and without any untoward effect; but it soon became clear that a number were still present in small sinuses stretching into the posterior wall of the tympanic cavity and of the external meatus. As they were very tightly packed and the entrances of the sinuses were rather narrow, the maggots had to be removed by forceps one by one. A final counting revealed that there had been 57 larvae within his ear.

Examination after complete clearance showed the ear to be quite clean, without any trace of pus. The sinuses into the posterior wall did not exist in the "normal" state; they were to be regarded as caused by the parasites. Close observation during the next few days showed that pus had formed again and that the sinuses had closed quickly. The further course of the case was uneventful.

COMMENT

Unfortunately it was impossible to save the larvae for metamorphosis into flies, so it was rather difficult to decide on the species. Dr. J. S. K. Boyd, of the Wellcome Laboratories of Tropical Medicine, stated that they belonged to "one of the species of the genus *Lucilia*, probably *L. sericata* or *L. caesar*."

The genus *Lucilia* (blow-flies) is the one most often encountered in human myiasis in Europe; but cases are very rare there compared with tropical countries. Myiasis due to larvae of the blow-flies is always superficial only. Sometimes the larvae are primary parasites—i.e., they attack healthy tissues. Mostly, however, the eggs are deposited on necrotic and putrescent matter (secondary parasitism), as in this case. Commonly the fly deposits its eggs in some quantity and the larvae get rapidly to work. In hot climates (the summer of 1947 was very hot) it takes 16 to 24 hours for the eggs to hatch; after four to seven days the larvae are fully grown and proceed to form the chrysalis.

Of practical importance is the fact that some of these parasites live on necrotic tissues only, while others, after starting from necrotic matter, secondarily attack living healthy tissues as well. *L. caesar* belongs to the former group, whereas *L. sericata* attacks living surroundings (the sinuses in the present case): both are therefore apt to cause very serious complications, such as perforation of the epitympanic bone and secondary infection of the meningeal spaces.

Contrary to surgical experience, the cleansing effect of the allantoin formed by the larvae was not lasting: a few days after removal of the maggots pus was present as before.

I am obliged to Drs. Lucas and Sherris, of the Central Pathology Laboratory, E.M.S., Stoke Mandeville Hospital, Bucks, for their kind help. May this short note be a token of my gratitude to all British colleagues, who, through 16 months, gave me so much help and assistance and showed that medicine does not know national barriers.

Mayen, Germany. HELLMUT W. F. BRAUNECK.

A pamphlet by Marion E. A. Williams entitled *Focus on the Disabled* has recently been published by Michael Works, Ltd. The founders of this company were "a small group of people convinced that disabled persons, previously regarded as unemployable, could be trained and employed in producing useful goods which could be offered in the open commercial markets at normal prices." Michael Works, Ltd., began work in 1946, small articles of woodware and simple occasional furniture being produced. The supervising staff consisted of managing director, secretary, medical officer, physiotherapist, industrial psychologist, and foreman. Close co-operation was maintained with the local resettlement officer of the Ministry of Labour. The disabilities of the workers employed in the factory varied from spastic conditions to neuroses. It was soon found that the workers could be trained to produce articles with a standard of quality as good as anything existing on the market, and the company has been successful in tendering for such work as the repair of school desks for the L.C.C. and for making new furniture for old people's homes. Any falling off in the working capacity of an employee is the signal for immediate consultation between the medical officer, managing director, and foreman. "In this way the medical knowledge available has been applied in practice at the earliest possible moment, with great saving in ill-health and absenteeism."

Reviews

DOCTORS' DRUGS

The British Pharmaceutical Codex, 1949. (Pp. 1,562. £3 3s. Inland postage 1s.) London: The Pharmaceutical Press. 1949.

Early in the century medical treatment consisted largely in the elaborate prescription of medicines elegantly flavoured, meticulously bottled, and exquisitely labelled. If 80% of these bottles had been poured into the sea the fishes only would have suffered. In that age, therefore, a knowledge of the action and uses of drugs was of secondary importance. It is very different nowadays. Medical men, often of modest attainments, find themselves—Jovelike—hurling terrifying therapeutic thunderbolts, and it now behoves them to know more about these alarming weapons of their trade than can be gleaned from the pharmaceutical advertisements which litter their breakfast tables.

In the *British Pharmaceutical Codex* of 1949 can be found all—and a good deal more—information than the doctor can ever expect to master about the preparations, doses, actions, and uses of drugs. There are in addition sections on serums and vaccines, preparations of human blood, and surgical sutures; and a formulary of prescriptions—hardly a pocket prescriber, as it involves over 300 pages—some of which have a faintly nostalgic nineteenth-century flavour about them but which must provide for every possible therapeutic contingency.

If only for the descriptive paragraphs on the action and uses of drugs this work should appeal to medical men as well as to pharmacists. These descriptions are masterpieces of concise, accurate, and comprehensive information, and on occasion do not hesitate to point out the worthlessness of the drug under discussion. It is perhaps prophetic that the sections devoted to the preparation of human blood and to surgical ligatures contain no Latin names: it would have been a nice exercise to translate "Concentrated Human Red Blood Corpuscles" into the more humane letters.

Although over 300 drugs have been deleted from this edition of the *Codex*, yet the pruning knife might with advantage have been used even more drastically. If the volume has a fault it lies in its perpetuating some drugs and prescriptions which have long since had their day and been found wanting. The work is otherwise an invaluable and handsome encyclopaedia of pharmaceutical, pharmacological, and therapeutic knowledge which is a monument to the industry and erudition of the committee of the Pharmaceutical Society which has been responsible for its publication.

D. M. DUNLOP.

ILLUSTRATIONS OF MARROW PATHOLOGY

An Atlas of Bone-Marrow Pathology. By M. C. G. Israëls, M.Sc., M.R.C.P. Illustrations by D. Davison. (Pp. 79; 12 coloured plates. £1 10s.) London: William Heinemann Medical Books. 1948.

This book contains about 50 large pages of text and 12 plates, all printed on art paper and well bound. The text is excellent. It begins with a concise account of the nomenclature of the blood cells and their development. Brief details of technique are given, and the morphology of the marrow cells is described. There follow short descriptions of the blood and bone marrow in health and disease.

The book has already received the compliment of being accepted as the standard English manual of haematological nomenclature. It must nevertheless be confessed that the plates are disappointing. They are greatly inferior to productions in other countries—for example, Schulten's *Sternalpunktion*, or Blackfan, Diamond, and Leister's *Atlas of the Blood in Children*. The delineation of blood cells is as specialized an art as the painting of miniatures, and artists who are otherwise excellent often fail at it. Haematological nomenclature is so controversial a subject at the present time, and European opinion has been so unanimously opposed to the new terminology for the red cells and their precursors recently introduced by Osgood and others in the U.S.A., that it is unfortunate that Israël's fine text and diagrams are so inadequately supported by the plates.

L. J. WITTS.

THE AETIOLOGY OF MONGOLISM

Mongolism (Peristatic Amentia). By M. Engler, M.D. (Pp. 208; 28 illustrations. £1 1s.) Bristol: John Wright and Sons. 1949.

In his preface to this monograph Dr. Engler makes a two-fold claim, and it is upon the validity of this claim that his book must be judged. He writes: "This monograph is intended both as a summary of everything that has ever been published on the subject of mongolian idiocy and as an attempt to show that there can only be *one* explanation of its cause." The nature of this unitary cause he states to be "a congenital degeneration or malformation produced by the implantation of a normal ovum, not affected by any heredity taint, in a pathological, i.e., diseased, uterine mucosa, which is unable to supply the embryo with sufficient nourishment. . . . This damage to the mucosa . . . and *this alone*, is the basic cause of mongolian idiocy."

No other form of degenerative abnormality has received more attention than mongolism, and Dr. Engler has evidently read widely the literature of the subject and the large number of explanations of causation which have been put forward. These he reviews systematically, but, in spite of all the arguments which he adduces in support of his own, it is doubtful if his positive assertion quoted above will command general acceptance. There are many considerations which militate against this theory as a complete explanation, depending as it does on so many assumptions. Until it can be proved that a diseased uterine mucosa always precedes and predetermines the birth of a mongol but not that of other forms of congenital amentia, the argument must be considered as belonging to that type of faulty reasoning known to logicians as *Inductio per simplicem enumerationem*.

On the other hand, the extraordinary uniformity in physical and temperamental attributes shown by mongols, whatever their nationality, places the type in a clearly defined class distinct from all other forms of degenerative amentia. Another point which has some significance in this connexion is the well-attested class-selectivity, for mongolism occurs with far greater frequency amongst the professional classes and highly intelligent thoughtful craftsmen than in the unskilled labourer class. It cannot be argued that this disparity is due solely to a differential infant mortality rate which carries off all the mongolian infants at birth or before their condition can be recognized.

So convinced is Dr. Engler of the validity of his pathological explanation that he proposes it should be implicitly enshrined in the term "Peristatic Amentia," which he would substitute for that of "Mongolism." But this

proposal to change from a term which for 80 years has admirably described the condition and has been universally accepted is not likely to recommend itself to many physicians, whose verdict on the theory which Dr. Engler asserts so positively will be "not proven."

G. A. AUDEN.

ANATOMY OF THE NERVOUS SYSTEM

Neurological Anatomy in Relation to Clinical Medicine. By A. Brodal. (Pp. 496; illustrated. £2 2s.) Oxford: The Clarendon Press. 1948.

Functional Neuro-Anatomy. By A. R. Buchanan, M.D. (Pp. 242; 199 figures. £1 12s. 6d.) London: Henry Kimpton.

Dr. Brodal's book will be indispensable to students of clinical neurology and of the greatest value to those already in practice, for it is an authoritative neuro-anatomical textbook that emphasizes the clinical applications of the subject. It is a translation of *Nevro-Anatomi,* which was first published in 1943 in Norwegian and was so successful that the author was persuaded to produce an English translation.

Dr. Brodal's approach to the subject is clearly the result of much careful thought. Although he is a neuro-anatomist of wide reputation he does not allow anatomical details to obtrude excessively to the exclusion of physiological and clinical observations, and he has managed to avoid including anatomical minutiae which, though of interest, are irrelevant to the purpose of the book. Despite this, carefully selected references to original papers will enable those interested to acquire as much detailed anatomical knowledge as is available.

This book is not generally suitable for preclinical medical students. For one thing, it is too long. Secondly, it is in places difficult to read quickly, for the author has taken particular care when discussing controversial points to make no statements or assertions without giving the evidence upon which they are based. Dr. Buchanan's book, however, is intended primarily for the student. The author has set out to present the essential material in as few pages as are compatible with an understanding of the subject. In this he has succeeded, and his concentration on the functional aspect of neuro-anatomy will not only maintain the student's interest but also emphasize the importance of a sound knowledge of the anatomy of the nervous system in future clinical studies.

While most of the information contained in this book is an expression of current knowledge and opinion, there is a notable exception. The chapter on the rhinencephalon expresses views which are now known to be outdated. For instance, the hippocampus is still described as a cortical olfactory centre, whereas the work of Le Gros Clark and others has shown conclusively that there is no evidence for such a conception. It is possible that the manuscript of this chapter was completed some time before publication, and it is to be hoped that this section will be revised in the next edition. The references to the literature have intentionally been kept to a minimum, but those included have been judiciously selected from recent publications.

G. WEDDELL.

PSYCHIATRY: A FRESH VIEWPOINT

Human Personality and its Minor Disorders. By William Harrowes, M.D., F.R.S.Ed. (Pp. 260. 15s.) Edinburgh: E. and S. Livingstone. 1949.

This book is an exposition of the psychiatric concepts formulated by Professor Adolf Meyer, who made a great contribution to psychiatric thought in America, and whose teaching has come to this country with many British psychiatrists who studied under him at Johns Hopkins. It is refreshing to encounter a viewpoint detached from the psycho-analytical theory which pervades most psychiatric literature at the present time. Dr. Harrowes has achieved this, and his book will therefore not please the confirmed analyst, but to any reader with an open mind it will be intriguing and will provide a pattern into which clinical experience can be fitted and from which a psychiatric philosophy can be developed.

The author maintains there is nowadays too great a tendency to make a neurosis out of the ordinary ups and downs of everyday life and to imagine that every worried man is in an anxiety state. He develops the thesis that every personality is the resultant of mental and physical forces, and that by using these forces it adapts the environment to itself or itself to the environment.

To approach his patient correctly the psychiatrist must make an assessment of his own potentialities, attitudes, and emotional habits and those of a few others, who must be chosen as being different from himself. From this self-analysis and its comparison with the observations made on others a degree of insight can be attained and a scale formulated against which clinical observations can be assessed. This process is analogous in its aim to the training analysis of the more conventional analytical schools.

The use of Meyer's "Life Chart" is explained in detail. It is a method for recording under several headings the main episodes in the history and the bodily and emotional lives of the subject. It provides a simple graphic way of setting out the main points in a case history. Readers not conversant with the writings of Adolf Meyer may find the phraseology a little difficult and the introduction of the "ergasias" confusing and even superfluous, but a bibliography of Meyer's works will enable the interested student to follow up his reading.

It is unfortunate that only ten pages of the book are allotted to treatment, and in future editions a more detailed exposition of method would relieve the disappointment the reader feels after the detailed descriptive and diagnostic expositions. The work can be recommended as suggesting an interesting line of thought to all serious students of psychiatry.

WILLIAM MOODIE.

A GUIDE TO SPONDYLITIS

Ankylosing Spondylitis. Part 1 by F. Hernaman-Johnson, M.D., D.M.R.E. Part 2 by W. Alexander Law, O.B.E., F.R.C.S. (Pp. 200; illustrated. £1 5s.) London: Butterworth and Co. 1949.

Before the first world war ankylosing spondylitis was regarded as a rare disease for which there was no effective treatment. How far its apparently greater frequency now is due to war conditions and how far to improvement in diagnosis is difficult to say, but it is still a reproach that it is often not recognized until three or four years after the first symptoms appear, when the patient is crippled and the time for effective treatment has passed. This book may therefore be strongly recommended as a guide to the recognition and management of the disease, especially to doctors in general practice, as well as on its merits, which are considerable.

Dr. Hernaman-Johnson had an exceptionally wide experience of the disease and the methods of treatment, and it is a matter of great regret that he did not live to see the appearance of the book. Written in a clear and attractive style and with excellent illustrations, it describes the condition from its earliest stage and discusses fully the

various forms of treatment—especially *x*-ray therapy, which is now recognized as the most effective method available. Vaccines and gold are also considered in detail, and though the author's views on their value will not be universally accepted his wide experience in their use cannot be completely ignored; but his advice about dosage must be studied, or harm rather than benefit may ensue. Drugs receive appropriate consideration, and the value of physiotherapy is stressed by both authors. A detailed description is given of methods in physiotherapy and of the exercises that may be performed at home, which are so important at all stages.

The section on the surgical treatment is based on the work of Smith-Petersen, of Boston. The treatment of crippling deformity of the spine and hips is fully described and illustrated, and other joints are not neglected. While this form of treatment demands highly skilled orthopaedic surgery the after-treatment falls within the province of the family doctor, who will profit from the admirable account given of the management of the patient, of active and passive movements, and of the use of splints and supports. The book is to be recommended to the specialist in rheumatic diseases as well as to the general practitioner.

C. W. BUCKLEY.

PUBLIC HEALTH FOR UNDERGRADUATES

An Introduction to Public Health. By E. W. Caryl Thomas, M.D., D.P.H. (Pp. 263. 15s.) Bristol: John Wright and Sons. 1949.

Dr. Caryl Thomas has brought his useful book up to date. It is an amplification of his lectures to medical students, and contains in a digestible form the material necessary for examinations. A praiseworthy attempt has been made to cover all the subjects that comprise the hygiene course in many undergraduate medical schools, and the communicable diseases have been included. The author has presented these topics in their historical setting. It is unfortunate that he has not been able to give more space to the personal, family, and social aspects of preventive medicine; these would have given life and colour to a branch of medicine which ought to be made more attractive to the young student. We are on the threshold of a revolution in general medical practice through which (as many hope and believe) the family doctor will devote his attention more and more to the preventive aspects of his art and to the promotion of health in the families under his care. Admittedly some enlargement of the book would be unavoidable, but interest would be increased and balance adjusted. The work is no doubt sufficient for the present time, but it sheds only a fitful light on that which is to come.

J. M. MACKINTOSH.

Failure of the Heart and Circulation, by Terence East, F.R.C.P. (2nd ed.; pp. 144; 6s.; London: Staples Press, 1949), can be thoroughly recommended for its grasp of a difficult subject, for its blend of classical and modern views, for its sense of proportion, and for the clarity and simplicity of its expression. It may be read with equal advantage by the undergraduate student, Membership candidate, and general practitioner. Left and right ventricular failure are distinguished; the theories of heart failure are discussed in the light of both traditional experience and modern data; the physiology of the circulation is not neglected; high and low output failure are described; and there are chapters on failure of the peripheral circulation and on syncope. Treatment is discussed fully. There is little to criticize except the insufficient emphasis laid on the benefits of a low sodium diet in left ventricular failure and congestive heart failure; full details of such a diet might have been included with advantage. This is a small defect in a refreshing and readable book which does further credit to its author.

BOOKS RECEIVED

[Review is not precluded by notice here of books recently received]

Rheumatism. By H. W. Crowe, D.M. 2nd ed. (Pp. 270. 17s. 6d.) London: Staples. 1949.

An Introduction to Clinical Perimetry. By H. M. Traquair, M.D., F.R.C.S.Ed. Foreword by N. M. Dott, F.R.C.S.Ed. 6th ed. (Pp. 332. 42s.) London: Henry Kimpton. 1949.

Granulomatous Inflammation. By W. D. Forbus, M.D. (Pp. 58. 12s. 6d.) Oxford: Blackwell Scientific Publications. 1949.

First Aid Manual. No. 1. By Sir Harold E. Whittingham, K.C.B., F.R.C.P., and Sir Stanford Cade, K.B.E., F.R.C.S. 9th ed. (Pp. 300. 3s.) London: Macmillan. 1949.

The Doctor's Profession. Edited by D. T. Jenkins. (Pp. 129. 4s. 6d.) London: SCM Press. 1949.

Health is Our Adventure. By G. Jeffree, M.B., B.S. (Pp. 95. 3s.) London: Church Missionary Society. 1949.

The Conduct of Life Assurance Examinations. By E. M. Brockbank, M.B.E., F.R.C.P. 3rd ed. (Pp. 176. 12s. 6d.) London: Lewis. 1949.

Paul Ehrlich. By M. Marquardt. Introduction by Sir Henry Dale, O.M., M.D. (Pp. 255. 25s.) London: William Heinemann. 1949.

The Psychologist in Industry. By M. E. Steiner. (Pp. 107. 9s. 6d.) Oxford: Blackwell Scientific Publications. 1949.

Transactions of the Medical Society of London. Edited by W. E. Tanner, M.S., F.R.C.S. Vol. 65. (Pp. 512. No price.) London: The Medical Society. 1949.

The Natural History of Mosquitoes. By M. Bates, Ph.D. (Pp. 379. 25s.) London and New York: Macmillan. 1949.

The Second Forty Years. By E. J. Stieglitz, M.S., M.D. Foreword by A. J. Carlson, M.D., Sc.D. (Pp. 317. 15s.) London and New York: Staples. 1949.

Syphilis: Its Course and Management. By E. W. Thomas, M.D. Foreword by J. F. Mahoney, M.D. (Pp. 317. 42s.) London and New York: Macmillan. 1949.

Evaluation of Chemotherapeutic Agents. Edited by C. M. MacLeod. (Pp. 205. 28s.) New York: Columbia University Press. London: Geoffrey Cumberlege. 1949.

Physiologie Medicale. By R. Fabre and G. Rougier. (Pp. 1,118. 2,500 francs.) Paris: Librairie Maloine S.A. 1950.

Les Suppurations Chroniques de l'Oreille Moyenne. By R. Maduro and collaborators. (Pp. 344. No price.) Paris: L'Expansion Scientifique Française. 1949.

Traitement par la Streptomycine. By E. Bernard, B. Kreis, A. Lotte, and collaborators. (Pp. 172. No price.) Paris: L'Expansion Scientifique Française. 1949.

Chirurgie Réparatrice. By R. M. D'Aubigné and collaborators. (Pp. 343. No price.) Paris: L'Expansion Scientifique Française. 1949.

Narco-analyse et Narco-diagnostic. By G. Heuyer. (Pp. 86. No price.) Paris: L'Expansion Scientifique Française. 1949.

Cancer. By J. Maisin. Vol. 1. (Pp. 248. 540 francs.) Paris: Casterman. 1948.

Die Komplettierung des Insuffizienten Pneumothorax. By H. Weber. (Pp. 126. 60 Sch.) Vienna: Wilhelm Maudrich. 1949.

Zentralnervensystem und Sauerstoffmangel-Belastung. By K. T. Dussik. (Pp. 157. 54 Sch.) Vienna: Wilhelm Maudrich. 1949.

Die Akute Polyneuritis und Polyradikulitis. By H. Reisner. (Pp. 74. Sch. 75.) Vienna: Wilhelm Maudrich. 1949.

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FROM COW TO CONSUMER

It is something of an achievement that representatives of the medical and veterinary professions have met together in committee and issued an authoritative and detailed report on the production, distribution, and control of milk supplies and agreed on a list of recommendations. That milk is "an essential food and the most dangerous vehicle for the spread of disease" has long been well known to the medical profession, but this blunt statement of the Joint Committee of the B.M.A. and National Veterinary Medical Association should have wide publicity throughout the country. The milk industry is in a sorry state. The administrative machinery is confused, and the duties of officials overlap. Three Ministries are concerned. The Ministry of Agriculture and Fisheries is responsible for production on the farm and the Ministry of Food for distribution. The Ministry of Health, which should be the most important, occupies "the role of a very junior partner." It is easy to discern in this the presence of administrative disorder and the apparent subordination of the health factor to other considerations. Each Ministry has its inspectorate, area officers, and local organizations; in addition there are four groups of administrative authorities acting locally, each with different functions, and the Milk Marketing Board laces the mixture.

The Joint Committee agrees with the general intentions of the Milk (Special Designations) Act, 1949, and there is no doubt that if the Minister of Food were prepared to use his new powers in specified areas to limit the retail sale of milk to grades sold under special designations, and to do so immediately in many areas, there would be a marked improvement in the quality and, what is even more important, in the safety of milk. The opinion of the committee, a unanimous one, that there should be only two designations—tuberculin-tested and pasteurized—is sound. All other designations should be eliminated, and the time should come when there is but one type of milk, pasteurized tuberculin-tested. When that happens—and there is no reason why it should not—the country will at last have milk that is both safe and clean. As things are to-day milk produced in clean conditions can be unsafe when it reaches the consumer. Dirty milk can be made safe but not clean by heat treatment, but some milk sold to the public is both dirty and unsafe. The committee deplores the trends in legislation which have put too much emphasis on milk as an agricultural product and too little on milk as a food of importance to health. That the committee is right is beyond question: if milk production is controlled by those whose interests are wholly agricultural it follows that the nutritional and health aspects tend to be neglected. Clearly, as the report suggests, the officers of local health authorities are the appropriate agents to supervise milk from cow to consumer, and their powers should be increased rather than diminished. The medical officer of health and his staff have long experience of milk sampling and testing: more important still, he is the guardian of community health and the medical representative of the consumer. If the administrative responsibility was placed on local health authorities not only would milk be safer but there would be a saving in money and in man-power by the release of a large number of the officers employed by the many overlapping authorities now in existence.

Morbidity in dairy cattle is high, mainly because of faulty management. In addition to the dangers of infection to consumers, the morbidity must be an enormous financial burden to agriculture: here at least farmers and health authorities have a common interest. The place of the veterinary surgeon is clear. He is the expert in the prevention and treatment of diseases of animals and should be the liaison officer between the farmer and the public health officer. The eradication of tuberculosis from dairy cattle is going to be difficult to achieve. The ideal remedy would be the slaughter of all beasts reacting to the tuberculin test, so that in the course of time only tubercle-free herds would remain. The effect of such a drastic measure would be an immediate and vast reduction in the amount of milk produced, and therefore it cannot be contemplated. Nevertheless more vigorous action should have been taken to avoid the unfortunate situation which has arisen from the drive in recent years to increase the quantity of milk produced, in the interests both of nutritional and agricultural needs, with too little regard to quality and safety. It seems that the Minister of Agriculture is now ready to act, for he announced last week the beginnings of a scheme to establish "eradication areas," from which all reacting cattle are eventually to be removed.

The committee recommends, "All milk should be from tubercle-free cows and should be pasteurized." This applies to the milk consumed in large cities, in towns, and in villages. Milk delivered in towns is stale compared with that consumed in rural districts, because of the time taken in transport to the populous centres. Paradoxically, milk sold in towns is safer because

pasteurization is carried out on a large scale in the towns and only to a small extent in the country districts. The annual report for 1948 of the medical officer of health of Manchester, typical of reports from other large centres, contains some interesting figures. In the case of pasteurized and heat-treated milk 92% of samples passed bacteriological and chemical tests satisfactorily, and all samples were negative for tubercle bacilli. Of ungraded milks 66% of samples were unsatisfactory, and 15% were positive for tubercle bacilli. The bad effect of the bulking of milk is illustrated by the fact that samples taken from tanker lorries coming into the city were all unsatisfactory bacteriologically, and 86% were found to contain tubercle bacilli on biological examination. This shows yet once more that housewives who cannot obtain pasteurized milk would be well advised to boil the family milk. The problem of providing the population with safe, clean milk from disease-free herds is by no means solved, but the report of the Joint Committee points the way to some much-needed improvements.

VISCERAL ACTINOMYCOSIS

In the Bradshaw Lecture, which we publish elsewhere in this issue, Mr. V. Zachary Cope discusses the subject of visceral actinomycosis. Among advances in our knowledge of this disease not the least concerns the origin of the infection, and authors who have not divested their minds of some of the more fanciful ideas entertained on this subject in the past may well take note of Mr. Cope's categorical assertion that this infection is autogenous. That grass or straw could be the source of a micro-organism of fastidious growth requirements which include anaerobiosis has never been credible, and actinomycetes found in such material are now recognized as distinct species. There remains one other hypothesis —that the disease can be acquired from cattle. The actinomyces which produces jaw lesions in these animals closely resembles the human organism in most of its characters, but according to Erikson[1] differs from it both in fermentation reactions and in antigenic constitution. Erikson's observations suggest that bovine and human actinomycetes are distinct, and, though it seems very unlikely that the human disease is commonly acquired from cattle, it cannot be taken as proved that this never occurs.

Among problems connected with this disease is one of nomenclature. The animal organism should clearly be called *A. bovis*, and there is a preference for calling the human *A. israeli*, though *A. hominis* has been suggested and is probably justified in its implication that the species found in man is distinct and peculiar to him. The study of these fungi would be simplified if they were pathogenic for laboratory animals, but attempts to reproduce the disease in this way, even when as persevering and varied as those of Rosebury and his colleagues,[2] have had only minor and inconstant results. The evidence that the usual source of the infection is the patient's own mouth, though in a sense circumstantial, is overwhelming. The close association with trauma in this region embraces not only dental extraction but compound fracture of the mandible, of which actinomycotic infection may be a consequence. Several workers have overcome the technical difficulties of demonstrating that actinomyces may exist in the gums of persons not suffering from the disease. It is significant that Rosebury[3] obtained the material on which his extensive studies of this organism are based mainly from a department of dental surgery.

The second problem connected with this disease is diagnosis, more particularly in its visceral forms. There is no disease of which the nature can be so obvious at necropsy when its features during life have been so obscure, and the physician or surgeon of long experience who has never seen an unexpected honeycomb abscess of the liver in the post-mortem room is fortunate. Disease in the appendicular region has the most insidious onset and is most likely to be unsuspected, since its only sign for many weeks may be the failure of a sinus following appendicectomy to heal. Responsibility in this matter rests on both surgeon and bacteriologist. Of the former Mr. Cope writes: "I purposely repeat that a final and important cause of failure to diagnose actinomycosis is that the disease may not be on the mental list of possible diagnoses which the observer goes through as a routine." The duty of the bacteriologist is similar: he must have this infection constantly in mind when examining pus from the neck, thorax, or right lower quadrant of the abdomen, particularly if it contains no other obvious pathogen. He must begin by using the naked eye in a search for granules, if he has been fortunate enough to be sent pus in a tube and not a mere swab. Finally, he must not be content with aerobic culture and what he may find in it. An actinomycotic lesion which has been draining is often secondarily infected; sometimes it contains other bacteria even in its earliest stages.

Mr. Cope's remarks about treatment are more encouraging than anything which could have been written more than five years ago. As was observed in these columns last year,[4] there has been a two-stage improvement in the treatment of this as of many bacterial infections. Sulphonamides, particularly sulphadiazine, have a marked suppressive effect: that of penicillin is clearly more potent and sometimes actually curative. The findings of Holm[5] on the effects of particle size on

1 *Spec. Rep. Ser. med. Res. Coun., Lond.*, No. 240, 1940, London: H.M.S.O.
2 *J. infect. Dis.*, 1944, **74**, 131.
3 *Bact. Rev.*, 1944, **8**, 189.
4 *British Medical Journal*, 1948, **2**, 830.
5 *Acta path. microbiol. scand.*, 1948, **25**, 376.
6 *Arch. Surg., Chicago*, 1948, **57**, 202.

the results of penicillin sensitivity tests suggest that the intact colony or "granule" in the body may be more resistant than its constituent elements, merely because its size and compactness prevent full penetration. Hence it is probably advisable to use fairly large doses of penicillin from the outset, and it is certainly necessary to continue the treatment for a longer time than in most other conditions. All writers on this subject are agreed that the prognosis is now much improved. Campbell and Bradford[6] describe six cases exemplifying this change. Three of appendicular origin, occurring in pre-penicillin days and treated respectively with "promin," sulphonamides, and *x* rays, were all fatal. One other fatal case was a man aged 84 in whom surgery was inadvisable: the remaining two—one thoracic, the other involving the liver—owed their recovery to penicillin combined with sulphonamides and surgery respectively. In the case in which surgery was successful a spherical liver abscess was wholly excised—an unusual surgical feat. The sensitivity of different strains of actinomyces to penicillin has been shown to vary, and for those found more resistant streptomycin is now a possible alternative.

NECESSARY ADJUSTMENT

Deciding that the Ministry's letter[1] on the remuneration of general practitioners should not be taken as closing the matter, the General Medical Services Committee resolved at its special meeting on December 1 to send a deputation to the Ministry in order to discuss certain figures and to seek an assurance that the Government intends to fulfil the Spens Committee's recommendations—as it has promised to do. Throughout these negotiations the Ministry has carefully avoided stating its views in precise terms about what has come to be called the betterment factor—that is, the figure by which the total pre-war income of general practitioners must be multiplied to translate it into the present value of money. The remuneration that general practitioners receive at present has never been anything but provisional. What is agreed between the Ministry and the profession is the total amount that general practitioners ought to have earned in 1939—£31.24 million. This is an estimate based on the Spens Report. The Spens Committee also referred to the "necessary adjustment" that must be made to translate its recommendations into present-day terms. Though the Government has accepted the Spens Report, it has never seriously discussed this important proviso in the Report. While the B.M.A. has taken pains to find out by how much the cost of living has increased, and obtained an expert opinion on it, the Ministry has not committed itself on the issue.

After admitting[2] that the estimates of payments to general practitioners for the year 1949–50 fall short of the Ministry's own calculations of the profession's claim by some £4.7 million, the Ministry argues that the claim "compares . . . with the sum of nearly £49 million already being provided." Apparently the comparison seems to the Ministry to be a close one; to those who receive the money it seems more distant. The gap is wider still, in the view of the G.M.S. Committee, when the B.M.A.'s figures are compared with the Ministry's, and the accuracy of some of the Ministry's figures will be challenged when the deputation goes to the Ministry. The Minister's view is said to rest "on the sheer merits of the case." Merits are more difficult to compute than figures, and the profession is unlikely to be satisfied with an attempt to refute its case by means of less rigorous arguments than its representatives used when preparing it.

All would agree with the Minister that the country's economic state precludes "unjustified raising of remuneration." But in the first place the general practitioner's claim has been justified by a careful analysis of the figures, and in particular of the betterment factor, whereas the Ministry's attempted refutation has not. And, secondly, it is misleading to speak of raising remuneration when what is now being paid was never agreed except provisionally. The profession will be gravely disturbed if the G.M.S. Committee has not received satisfactory assurances before its next meeting early in the New Year.

YELLOW FEVER IN AFRICA

Knowledge of the distribution of yellow fever in Africa was not very different 20 years ago from what it had been 200 years earlier. Yellow fever was, it was thought, confined to the countries bordering on the west coast of Africa from the Senegal to the Cameroons, with possibly an extension to the mouth of the Congo. After the discovery that the infection could be transmitted to rhesus monkeys and then to mice it became possible to devise protection tests; these indicated the presence of virucidal bodies in the sera of those who had once had yellow fever, and, since the immunity to one attack of yellow fever is lifelong, it was not difficult to determine the extent of the immunity in different age groups. Even before 1939 the mouse-protection test had disclosed that there were children with immune bodies to yellow fever in Uganda and in the Anglo-Egyptian Sudan as far east as the Blue Nile. In the absence of proved clinical cases, however, it is not surprising that colonial Governments were loath to conclude that yellow fever was endemic in their particular areas. But the large outbreak of yellow fever in 1940 in the Nuba Mountains removed the last possible excuse for disregarding the significance of the mouse-protection test. Since then the area in Africa where yellow fever has been found to be present has slowly but surely extended. Positive

[1] *British Medical Journal Supplement*, 1949, **2**, 218.
[2] *Loc. cit.*

[1] *Ann. trop. Med. Parasit.*, 1949, **43**, 182.

mouse-protection tests in the south-eastern part of the Sudan were soon followed by recognition of a clinical case. The infection was found in Eritrea, Somalia, and Kenya, and to the south the Balovale district of Northern Rhodesia also was shown to be an endemic area.

Recent surveys by Smithburn and his colleagues,[1] carried out between 1944 and 1948, indicate that the limits of the endemic yellow-fever area have not yet been reached. In various parts of Kenya, especially in the Langata forest, tests on children's sera were positive. In Tanganyika immune children under 15 were discovered at Tanga, Lindi, and Moshi. At Lilongwe, among other infected areas in Nyasaland, 7 of 37 children under 15 were positive. In Northern Rhodesia positive results were obtained in all areas investigated, and there is little doubt that along the Zambesi infection is common, for of 789 children and 2,266 adults examined no less than 229 were positive. This is a higher rate than for any other country in the eastern half of Africa. Although Swaziland, so far as it has been examined, has given negative results, Bechuanaland is infected: at Mohembo 3 of 24 tests on children were positive. At Massanga in Mozambique positive results were obtained in tests on adults and children. Since the endemic yellow-fever zone already extends at least as far south as Tsau, in Bechuanaland, just south of the twentieth parallel of latitude, the Government of the Union of South Africa now has certain important sanitary problems to face. Every year many thousands of African labourers migrate, mostly on foot, to the mines on the Rand from the Rhodesias, Nyasaland, Mozambique, and Bechuanaland. It is possible that they may become the agents responsible for the spread of yellow fever over South Africa. Two possible courses are open to the sanitary authorities in the Union—the immunization of all labourers before they reach the Union, and the eradication of all yellow-fever vectors, especially *Aëdes aegypti*, within the borders of South Africa. Either course will be expensive and require careful organization.

Results of recent surveys elsewhere are also of interest. For some time past the Egyptian authorities have been seriously exercised over the importation of yellow fever: positive results have been obtained in tests on adults and children in Nuba, Luxor, Safaga, and Kosseir. Plainly further tests are necessary, but meanwhile it is obvious that the yellow-fever zone in Africa must be adjusted in accordance with the information now available.

PENICILLIN IN PURULENT PACHYMENINGITIS

The use of penicillin as an ancillary to the surgical treatment of intracranial infection has improved the prognosis in many cases which would otherwise almost certainly have ended fatally. Sir Hugh Cairns, Professor Dorothy Russell, and Dr. F. Schiller[1] have reviewed the results of the treatment of purulent pachymeningitis over a 20-year period, both before and after the advent of penicillin. Of 23 patients who received no penicillin or who were treated in the early period after its discovery when adequate supplies were not available, all died; while seven patients recovered out of 10 treated adequately with penicillin combined with surgery.

Purulent pachymeningitis, a condition "characterized by a film of pus of variable thickness in the subdural space spreading over part or whole of one or both cerebral hemispheres," is usually secondary to spreading osteomyelitis of the skull or facial bones, which itself is one of the rarer but most serious complications of infection of the accessory nasal sinuses or middle ear. The condition is recognized clinically by the onset of widespread paralysis due to cortical damage, associated with a rise in intracranial pressure, and before the advent of penicillin usually ended fatally within two weeks. Extradural abscess and thrombosis or thrombophlebitis of the venous sinuses and cerebral veins are frequent complications, and cerebral abscess may occur later. A remarkable finding in Cairns's series was that in the 27 cases in which bacteriological reports were available the causal organisms in 25 were streptococci of anaerobic or non-haemolytic types. This is contrasted with the findings in 22 cases of osteomyelitis of the skull not complicated by purulent pachymeningitis: in 14 of these the infection was due to staphylococci.

The treatment adopted by the authors was to administer penicillin by the systemic, subdural, and subarachnoid routes and to remove large collections of pus as they arose by minor surgical operations. Intramuscular injections of penicillin in doses of 100,000 units three-hourly were begun immediately on diagnosis, and were continued for at least eight weeks in all cases complicated by osteomyelitis, thrombophlebitis, or loculation of pus in the subdural space. Although penicillin was shown to diffuse readily into the subdural space, experience with two cases suggested the advisability of raising the local concentration by means of rubber catheters inserted through burr-holes. As much of a solution containing 500 units per millilitre as the space would hold was instilled at three-hourly intervals; this also had a mechanical action in preventing formation of local subdural abscesses. Subarachnoid or intraventricular penicillin was given if leptomeningitis was present or, as a prophylactic measure, if exploratory operations through an infected field were necessary; for the latter purpose injection of a single dose of 10,000–15,000 units into the ventricle was recommended. With this method of treatment the removal of large areas of infected bone was unnecessary, surgical treatment being confined to removal of sequestra or persistent foci of infection. Subdural abscess developed in seven of the 10 cases adequately treated with penicillin, and the authors stress the importance of early recognition and treatment of this complication. The commonest site was the posterior part of the falx cerebri and adjacent part of the tentorium, and on *x*-ray examination after the injection of "thorotrast" into the abscess cavity a characteristic shadow was seen, which facilitated the differential diagnosis from cerebral abscess. Daily instillation of 200,000 units of penicillin in 2 ml. through an indwelling catheter for at least five days was found to be necessary to secure healing.

The results of treatment in the six survivors who were followed for periods of from six months to five years were very satisfactory: functional recovery was complete in five, including four with aphasia. The authors stress that good

[1] *J. Neurol. Neurosurg. Psychiat.*, 1948, **11**, 143.
[2] Turner, A. L., and Reynolds, F. E., *Intracranial Pyogenic Diseases*, 1931, Edinburgh.

results can be expected only if treatment is begun in the early stages, before subdural loculation has occurred; but, since purulent pachymeningitis most commonly follows operations (even simple antrum puncture[2]) for chronic pansinusitis or mastoiditis, the authors suggest that in all such cases prophylactic penicillin should be given in order to prevent its development. The routine use of prophylactic penicillin in otorhinological practice will undoubtedly reduce the incidence of serious intracranial complications, which may follow any operative procedure however skilfully performed.

STRESS, FIBRINOLYSIS, AND ATHEROMA

Atherosclerosis is widely regarded as a stress disease which contributes to the premature ageing of arteries, randomly curtailing intellectual or physical capacity and commonly shortening the days of man. Converging lines of investigation—Duguid's on the fibrinous origin of atherosclerosis,[1-3] Macfarlane's on fibrinolysin activity of the blood during life,[4-7] and Mole's on fibrinolysin and the fluidity of the blood post mortem[8]—open up a new approach to this aetiological problem. There is the further promise of additional valuable information from the concept of "adaptation diseases" developed by Selye,[9-10] from his analyses of the body's defences against stress and strain. Comment on Selye's work has already been made in leading articles in this *Journal*.[11]

As a result of his histological study of coronary arteries and aortas Duguid concludes that mural thrombi on vascular endothelium can be transformed, by the interplay of fibrous organization, fatty change, and acquisition of fresh endothelial lining, into typical atherosclerotic nodules. The frequency with which this transformation occurs is not yet known, but the opportunities are plentiful: Duguid found that mural thrombi, either fibrinous or mixed, are common, and that at least some of them develop into atherosclerotic thickenings. He makes the deduction that these thickenings may depend not only on factors which act on the tissues of the vessel wall but also on those which govern fibrin formation in the circulating blood. In their investigation of the latter factors Macfarlane and his associates found that fibrinolysis activation in the blood during life may be the initial result of a variety of stimuli having in common the exposure of body or mind to unusual stress. This activation in normal blood may be a component of the initial shock phase of Selye's alarm reaction. Mole points out that during life there is a continual production of fibrinogen by the liver, that this must involve a continual removal from the blood stream, and that normally some deposition of fibrin would be expected. Having investigated the relation between fibrinolysin and the fluidity of the blood at necropsies, he considers that fibrinolysin is most probably produced by the vascular endothelium and that this may be the natural physiological means of preventing undue mural deposition of fibrin in health. Failure of fibrinolysis will promote the deposition of mural thrombi, which may form the initial lesion in atherosclerosis. Such failure, for example, occurs in infection and cachexia, conditions which favour thrombosis. Mole concludes that there is an obvious connexion between the presumptive failure of fibrinolysin to prevent mural thrombi and the view that atherosclerosis is a failure in the body's defence against stress and strain. The tentative concept which emerges from these investigations has wide implications—that failure of fibrinolysis is related to atherosclerosis and that both processes are threads in the variegated pattern of the body's responses to stress.

[1] *J. Path. Bact.*, 1946, **58**, 207.
[2] Ibid., 1948, **60**, 57.
[3] *Lancet*, 1949, **2**, 925.
[4] Ibid., 1937, **1**, 10.
[5] Ibid., 1946, **2**, 562.
[6] Ibid., 1946, **2**, 862.
[7] Ibid., 1947, **1**, 402.
[8] *J. Path. Bact.*, 1948, **60**, 413.
[9] *J. clin. Endocrinol.*, 1946, **6**, 117.
[10] *Ann. intern. Med.*, 1948, **29**, 403.
[11] *British Medical Journal*, 1949, **1**, 812, and 1949, **2**, 1159.

RESPIRATORY DEPRESSION AND ATELECTASIS

One of the more important of the several factors concerned in the development of post-operative pulmonary atelectasis is the diminution of respiratory movements during the immediate post-operative period.[1] Some interesting information about depressed respirations in the absence of complicating factors has been obtained by Swank and Smedal,[2] who studied the pulmonary changes during deep sleep in 350 patients undergoing sodium amytal narcosis for the treatment of combat neurosis. It was found that respirations were shallow throughout the period of deep sleep, the tidal air being reduced from 550–750 c.cm. to 150–300 c.cm. and the diaphragmatic excursion (observed by fluoroscopy) from 3 cm. to 1 cm. Periods of apnoea were noted during the induction phase, but the respiratory rate returned to normal as sleep deepened. Cyanosis was present almost invariably and responded to inhalation of pure oxygen The depth of respiration increased on breathing 100% oxygen, and no further increase was obtained by the introduction of 5% carbon dioxide. Twenty-eight patients were examined radiologically before, during, and after the three days of narcosis. Ten of these showed changes which were considered to be the usual concomitants of deep sleep—namely, symmetrical elevation of the diaphragm and narrowing of the thoracic interspaces. In addition, cloudy patches appeared in the lung fields of 18 patients, together with greater elevation of the diaphragm and narrowing of the interspaces on the same side. These changes were regarded as sufficient evidence of pulmonary atelectasis. In four patients the atelectasis persisted for two to six days after the end of the treatment, and all these patients had fever and tachypnoea. The authors considered that the focal changes in the lungs were due to lobular or segmental atelectasis, and that the fever was secondary to the lung changes.

The occurrence of lobular atelectasis has often been disputed, since it is known that in normal conditions interalveolar gaseous interchange takes place via the pores of Kohn.[3] It has been shown, however, that when respirations are sufficiently depressed this gaseous interchange is absent.[4] Thus shallow breathing can contribute to the development of atelectasis in several ways: the bronchi.

[1] Brock, R. C., *Guy's Hosp. Rep.*, 1936, **86**, 191.
[2] *Amer. J. Med.*, 1948, **5**, 210.
[3] Van Allen, C. M., Lindskog, G. E., and Richter, H. G., *Yale J. Biol. Med.*, 1930, **2**, 297.
[4] —— —— *Arch. Surg.*, 1930, **21**, 1195.
[5] Drinker, C. K., *Pulmonary Oedema*, 1945, Cambridge, Mass.

narrowed in the position of expiration, are easily obstructed by mucus; the upward thrust from bronchial peristalsis is minimized; and the occurrence of lobular collapse brings about a diminution of the effective tidal air and precipitates segmental collapse. An additional factor is that anoxia produces an increase in lymph flow and excessive bronchial secretions.[5] The knowledge that patchy pulmonary atelectasis arises from depression of breathing is important, for a number of clinical states are characterized by shallow breathing. Lobular atelectasis may well be the precursor not only of post-operative chest complications but also of the bronchopneumonia which occurs in old and debilitated patients and in those in coma due to any cause. The value of active or passive breathing exercises in the treatment of such patients cannot be too strongly emphasized.

LIVER PATHOLOGY AND FUNCTION TESTS

Although modern liver function tests have helped clinicians in both diagnosis and prognosis, their relation to hepatic histology has never been exactly determined. This is largely due to the difficulty of collecting a sufficient number of cases in which biochemical tests and histological examinations are performed at the same time. The possibility of inquiring into the relationship has now existed for some years, since liver puncture has become a common diagnostic procedure, and a number of workers have reported the results of their investigations.[1-2] These studies have disclosed a limited correlation in acute hepatitis between the extent of hepatic damage and the serum bilirubin and albumin levels, and also a relationship between thymol turbidity and regeneration combined with periportal infiltration. However, no conclusion which applies to all types of liver disease was reached, and many of the tests, such as the hippuric-acid test, could not be correlated with any definite histological feature.

More definite results have recently been reported by Franklin and Popper and their colleagues,[3] who carried out liver function tests and liver biopsy or puncture in 135 cases. The histological results were expressed in a numerical form, and the correlation between a number of definite histological features and liver function tests was determined by appropriate statistical methods. The most important of the significant correlations was that of diffuse liver cell damage with the albumin/globulin ratio, the cephalin-cholesterol flocculation, the thymol turbidity, and bromsulphthalein retention (the last only in non-jaundiced patients). Other correlations to be established were liver-cell regeneration with increased thymol turbidity, distorted reconstruction of the lobular pattern with cephalin-cholesterol flocculation, thymol turbidity and erythrocyte sedimentation rate, and Kupffer cell activity with serum bilirubin and the albumin/globulin ratio. No relationship was found between parenchymal damage and total serum protein, total cholesterol, the cholesterol ester ratio, urinary urobilinogen, stool urobilinogen, alkaline phosphatase in general (and markedly elevated alkaline phosphatase specifically), non-protein nitrogen, and the erythrocyte sedimentation rate. The mainly negative results with the serum alkaline phosphatase test are surprising, since this test can undoubtedly be correlated with biliary obstruction. It would appear that some of the functional changes in the liver cell in biliary obstruction cannot be shown histologically—a fact which demonstrates an important distinction between biochemical and histological investigations. These results give theoretical backing to a number of tests, such as the flocculation tests, which have usually been labelled "empirical." It has long been obvious from clinical studies that they were closely related to liver disease, but they can now be interpreted with more confidence against a background of liver histology. It is to be hoped that further similar studies will be undertaken for the purpose of correlating biochemical with clinical and pathological findings.

[1] Sherlock, S. P. V., *J. Path. Bact.*, 1946, **58**, 523.
[2] Hoffbauer, F. W., Evans, G. T., and Watson, C. J., *Med. Clin. N. Amer.*, 1945, **29**, 363.
[3] Franklin, M., Popper, H., Steigmann, F., and Kozoll, D. D., *J. Lab. clin. Med.*, 1948, **33**, 435.

HOME FEEDING OF INVALIDS

The Invalid Kitchens of London is one of the few organizations which work to keep people well so that they do not need to be admitted to hospital. Started some years before the war, this service, which is still supported by voluntary contributions, prepares suitable diets for patients who would otherwise have difficulty in obtaining them. Kitchens (17 before the war) scattered over the Metropolitan area provide a six-day service of midday meals, but only to patients whose doctor gives them a prescription. Each kitchen is managed by an experienced cook, and all are regularly supervised by an expert dietitian. Meals are served at the kitchen to individuals who are ambulant, but some can be sent out to patients who are confined to house or bed. Extension of the latter service is difficult, because all the meals have to be dispatched within a short period of time, roughly between 11.30 a.m. and 2 p.m., and the number of vans or cars in use is limited. Some of the premises were damaged during the war, and now only seven kitchens are in use, but the organization is active and anxious to expand. Invalid Kitchens of London differs from other organizations serving meals by van—for example, the Red Cross "Meals on Wheels" or the W.V.S. meals service, which in the main benefit healthy old people—in that no patient can be served without a medical prescription. The meals cost 1s., and all the commoner forms of medical diet can be supplied—meals for patients suffering from gastric or duodenal ulcers, from diabetes, and for patients requiring a salt-free diet. The kitchens also undertake to prepare any special diet which may be ordered. This service helps patients—particularly those suffering from duodenal ulcer—to return to their homes and work after a short stay in hospital, for they can obtain an appropriate diet with little trouble to themselves. In the past there has been much waste of time and money and much disruption of home life because after a prolonged and costly stay in hospital a patient has often gone home and been unable to continue with the special diet ordered; consequently the illness has recurred and a further long stay in hospital has become necessary. The encouragement and expansion of activities similar to that of the Invalid Kitchens of London will certainly help towards freeing hospital beds; better still, such services have a positive value in preventing illness.

REFRESHER COURSE FOR GENERAL PRACTITIONERS

THE MANAGEMENT OF DIABETES MELLITUS

BY

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Diagnosis

The discovery of a reducing substance in the urine should always be regarded as abnormal no matter what may be the age of the patient. If the partial and atypical reductions produced by drugs such as aspirin, salicylates, and chloral are excluded—and this can easily be done by stopping all medicines for a few days—persistent glycosuria is almost always due to diabetes mellitus or to a lowered renal threshold for sugar (renal glycosuria). Symptoms such as thirst, polyuria, loss of weight, lassitude, or pruritus vulvae make the diagnosis of diabetes more than probable, but a definite diagnosis of this disease should not, if possible, be made without the confirmatory evidence of a raised blood sugar.

It is bad practice to prescribe a restricted carbohydrate diet for patients with undiagnosed symptomless glycosuria, as this may result in quite needless treatment of nothing more than renal glycosuria. The diagnosis of renal glycosuria should be suspected when the glycosuria is symptomless, occurs only after meals, and is unassociated with ketosis; a family history of this condition is not uncommon.

A blood-sugar curve or glucose-tolerance test is the most certain method of diagnosis of the cause of glycosuria, but is only necessary in a very small proportion of cases. It should be carried out after the patient has been on full diet for at least a week, as a low carbohydrate diet may produce misleading results. When glycosuria is associated with symptoms of diabetes a single blood-sugar estimation performed about two hours after a good carbohydrate meal will almost always confirm the diagnosis, figures of 180 or more indicating the presence of diabetes. In the absence of symptoms when the blood sugar lies between 130 and 180 it is more difficult to be certain, and a blood-sugar curve is advisable. The association of symptomless glycosuria with a blood sugar of 120 or less is strongly suggestive of renal glycosuria, especially if a normal figure is obtained on more than one occasion. It is important to remember that the single diagnostic blood sugar should be taken about two hours after a meal, not in the fasting state. A normal result may be obtained in fasting patients with mild diabetes.

Clinical Types

Clinically, diabetics may be subdivided into two main groups—moderately severe or severe, and mild obese.

Moderately Severe or Severe.—This group consists of all children and adults up to the age of about 45, and a number of old patients of 70 and upwards. They present the textbook picture of diabetes, with loss of weight as a marked feature of the disease. They are liable to develop ketosis and if untreated may die in diabetic coma.

Mild Obese.—This group consists chiefly of middle-aged and elderly women. Obesity is a striking feature, loss of weight being insignificant or absent. Ketosis and diabetic coma do not occur. Patients of this type rarely complain of the typical symptoms of diabetes, except pruritus vulvae. Medical advice is often sought on account of this or some complication such as retinitis or vascular disease affecting the toes or feet.

The subdivision of diabetics into these two main types is not of course a hard-and-fast one. Typical severe diabetes is seen at all ages, and young cases may be mild, but the clinical picture and treatment of each group differ sufficiently to make this classification one of considerable practical importance.

Diabetes may be treated by diet or by diet and insulin The use of insulin without diet is generally unsatisfactory and often dangerous.

Diet

It is customary to allow diabetics average amounts of protein and fat, to the extent of the Ministry of Food ration for diabetics, and to restrict only the intake of carbohydrate. Comparatively few diabetics are willing or able to weigh their food, and visual methods of estimation, though less accurate, give reasonably good results. This does not mean that scales have no place in the treatment of diabetes, as they are of great value in teaching and checking visual measurements.

A convenient form of diet card is that devised by Lawrence and used in the Diabetic Department at King's College Hospital. In this the protein foods such as meat, fish, bacon, eggs, and cheese are listed, and allowed in average helpings. The fats such as butter, margarine, cream, and olive oil are similarly treated. Green vegetables except peas, tomatoes, mushrooms, and onions are allowed without restriction; so are sour fruits such as lemons, stewing gooseberries, red currants, and rhubarb. The foods rich in carbohydrate are listed in amounts containing 10 g. of carbohydrate, and each is called a "portion" or "black line." The number of portions allowed for each meal is prescribed, and the patient can vary his diet by selecting the portions from the list provided. Greater variety can be obtained by the use of 5-g. portions, but the 10-g. method is easier and more convenient. In my opinion the technique of dieting by calorie values is more complicated than the above, is rarely understood by patients, and is open to serious theoretical objections.

In mild diabetics who are not overweight it is wise to start treatment with a diet containing about 120 g. of carbohydrate (12 portions) evenly distributed over three or four meals. If the urine becomes sugar-free the carbohydrate can be gradually increased to 150 or even 180 g. Persistent glycosuria or progressive loss of weight means that diet alone is insufficient to control the diabetes, and that the diet should be raised and the patient given insulin (see below).

When diabetes is associated with obesity it is important to reduce the patient's weight, as this is usually the best way of controlling the diabetes. In such cases the diet should contain 80 to 100 g. of carbohydrate (8 to 10 portions), and fatty foods of all kinds should be reduced to a minimum. If this fails to reduce weight and control the

diabetes the patient may with advantage eat nothing but fruit, or abstain from food altogether, for one day each week. This method of treatment should be used only in mild obese diabetics who show no tendency to develop ketosis.

Diet and Insulin

In the absence of significant ketosis it is usually wise to start treatment with a restricted carbohydrate diet without insulin. This has the double advantage of giving the patient the benefit of any doubt that may exist about the necessity for insulin injections, and of allowing time for him to become familiar with the principles of dieting before learning how to inject insulin. In a week or two it is clear in the majority of cases whether or not insulin is necessary. The persistence of heavy glycosuria, especially in the fasting morning specimen, indicates the need for insulin, and a decision must be made on the type of insulin most likely to be suitable for each case. Three insulin preparations are in common use in this country: soluble insulin (S.I.), protamine-zinc insulin (P.Z.I.), and globin insulin (G.I.). S.I. is prepared in strengths of 20, 40, and 80 units per ml., and P.Z.I. and G.I. in strengths of 40 and 80 units per ml.

Single Injection of P.Z.I.

For relatively mild cases whose diabetes cannot be satisfactorily controlled by diet alone a single morning dose of P.Z.I. often gives excellent results. The diet should be evenly distributed over four meals, and a bedtime feed of 15 to 20 g. of carbohydrate given to prevent nocturnal hypoglycaemia, the danger of which makes it wise not to exceed a maximum dose of 40 units. If this method is adopted, the urine should be tested for sugar before breakfast, the bladder having been emptied on rising; this specimen, called the second morning specimen, should be sugar-free. If the blood sugar before lunch is less than 200 mg. per 100 ml. the control may be regarded as satisfactory. There may be some glycosuria in the evening, but this is usually transitory and can be ignored. If, however, heavy glycosuria persists throughout the day, a single dose of P.Z.I. is bad treatment, and the insulin dosage should be changed to a mixed injection of S.I. and P.Z.I., or to morning and evening injections of S.I.

Mixed Injection of S.I. and P.Z.I.

The mixed-dose method of treatment is suitable for diabetics who lead reasonably regular lives with regular mealtimes. It is less suitable than two injections of S.I. for those whose occupation makes this type of life impossible. The diet should be so arranged that the greater part of the carbohydrate content is taken in the earlier part of the day, while the S.I. is active. The following is a suitable arrangement of carbohydrate for use with a mixed injection of S.I. and P.Z.I.

Breakfast	40 to 60 g.
Lunch	40 g.
Tea	30 g.
Evening meal	30 to 40 g.
Bedtime	15 to 20 g.

Treatment may be started with a single dose of P.Z.I. and S.I. added later, or a mixed injection may be given from the outset. It is well to remember that when these two insulins are mixed a certain amount of S.I. is converted into P.Z.I., and the dose of the former should therefore in most cases be equal to or larger than that of the latter. A convenient way of starting treatment is to give equal amounts of S.I. and P.Z.I., 12 to 16 units being a suitable order of dosage in cases of moderate severity. The dose of S.I. is then adjusted until the urine test (or, better, the blood sugar) is satisfactory at the time of maximum S.I action—that is, before lunch for doses up to about 30 units and before tea for larger doses. P.Z.I. should be adjusted from the second morning specimen in the manner described above. The persistence of heavy glycosuria before the evening meal, especially if it is associated with ketosis or a recurrence of diabetic symptoms, such as thirst or polyuria, may be treated by the addition of an injection of S.I. before tea or supper. In these circumstances, however, it is wise to consider whether it would not be better to give the patient morning and evening injections of S.I. or the modification of this form of treatment described below.

Morning and Evening Injections of S.I.

This is the oldest and one of the best methods of treating diabetes with insulin. It has the advantage of simplicity and elasticity, it allows a relatively large breakfast and evening meal, and the time of the latter can be varied within reasonable limits. The times at which hypoglycaemia reactions are apt to occur are easily predictable, and suitable precautions can therefore be taken to prevent this important and potentially dangerous complication. The disadvantages are the necessity for a second injection and the tendency in severe diabetics for a relapse to occur before breakfast, owing to the relatively short duration of action of S.I. It is important to remember that the duration of action of S.I. or any other insulin is proportional to the size of the dose injected. A relatively large dose of S.I. can be given before breakfast, and any tendency to hypoglycaemia corrected by means of a mid-morning feed of about 20 g. of carbohydrate. In the evening it is usually not safe to give such a large dose, so there is a greater tendency for relapse to occur about 8 to 10 hours after

SCHEME OF TREATMENT

	Diet Alone		Diet and Insulin			
	Trial Diet*	Reducing Diet†	Single Injection of P.Z.I. →	Mixed Injection of S.I. and P.Z.I. →	Morning and Evening S.I. →	Morning S.I. Evening S.I. and P.Z.I. →
Breakfast	40	20–30	40	40–60	40–60	60
11 *a.m.*	—	—	—	—	20	20
Midday	40	30–40	30	40	40	40
Tea-time	—	—	30	30	0–20 →	0–20 →
Evening	40	30	30	30–40	40–60	40–60
Bedtime	—	—	20	10–20	10	20

All figures in grammes of carbohydrate. 10 g. carbohydrate = 1 " black line " (Lawrence). → = Time of insulin injection.

*Increase to 180 g. daily if urine remains sugar-free.
†If weight still not reduced, order one fasting day a week.

the injection. The following modification of this method of treatment is usually successful in preventing this form of relapse, and is particularly suitable for the control of very severe diabetics, pregnant diabetics, and some children.

Morning S.I. and Evening S.I. with P.Z.I.

The addition of a small dose of P.Z.I. to the evening injection of S.I. tends to prevent early morning ketosis and controls the fasting blood sugar. The smallest dose of P.Z.I. which prevents morning ketosis should be given in most cases, and the best results are obtained when the mixed evening injection is given not later than 6 p.m. When given early in this way the S.I. has passed its period of maximum action by the time the patient goes to bed, and a buffer feed on retiring reduces the risk of hypoglycaemia during the night. The P.Z.I. acts relatively weakly but continuously throughout the night, and in consequence morning ketosis is abolished and the fasting blood sugar prevented from rising to too high a level. If too much P.Z.I. is added to the evening dose of S.I. the fasting blood sugar may be made so low that it is impossible to give an adequate dose of S.I. before breakfast without producing severe hypoglycaemia during the late morning. For both of these arrangements of insulin the diet should be prescribed in some such manner as the following.

Breakfast	60 g.
11 a.m.	20 g.
Lunch	40 g.
Tea	0 g.
(or 20 g. if the morning S.I. exceeds 40 units)	
Evening meal	60 g.
Bedtime	20 g.

Urine tests should be made before lunch or tea, whichever is the better. The time will depend largely on the size of the morning dose of S.I., more resistant patients often giving the better test in the afternoon.

Globin insulin (G.I.) may be used alone instead of P.Z.I. as a single injection method of treatment, or may be mixed with S.I. and given once or twice a day. Given alone before breakfast G.I. will often control relatively mild diabetes satisfactorily, but small doses tend not to maintain their action throughout the 24 hours, while large doses of 40 units or more are liable to produce severe hypoglycaemia before lunch or tea. G.I. is useful in those cases in which P.Z.I. fails to control hyperglycaemia by day but causes hypoglycaemia during the early hours of the morning. It gives good results in some difficult very insulin-sensitive cases also, in which it may be given by morning and evening injections, either alone or with a small dose of S.I. The diet for a single dose of G.I. is the same as that for a single dose of P.Z.I. with the omission of the bedtime feed.

Urine Tests

It is important to realize that urine tests should be made at the time of maximum insulin action, not after meals. Most diabetics, however good their treatment, are likely to pass sugar after eating. Attempts to render the urine sugar-free after meals may result in severe hypoglycaemia before the next meal. Always, therefore, test the urine before meals and at the time when the type of insulin used is known to be exerting its maximum action. In the case of P.Z.I. this will be before breakfast, and with S.I. about four to eight hours or more after injection, according to the size of dose. The bladder should be emptied half to one hour before the urine for testing is passed, so that the result is not confused by the presence of sugar secreted after the previous meal

Children

The treatment of children is similar in principle to that of adults, but insulin is required in almost every case. Children are usually very sensitive to insulin, with the result that there may be wide fluctuations in blood-sugar level, periods of heavy glycosuria giving place rapidly to hypoglycaemia. The aim of treatment should be to provide an adequate and reasonably attractive diet, to avoid ketosis, and to render the blood-sugar level normal, or nearly so, for some period of the 24 hours. Any attempt to keep the urine perpetually sugar-free is bound to result in hypoglycaemic reactions. If these aims can be achieved with a single injection daily, so much the better for the child and those caring for it. Very often, however, especially at or about puberty, it is necessary to change over to two injections. S.I. before breakfast and S.I. with P.Z.I. before tea is a particularly suitable method of treatment at this difficult period in the life of the child diabetic.

The diagnosis and treatment of ketosis, including diabetic coma, and hypoglycaemia will be considered in next week's article.

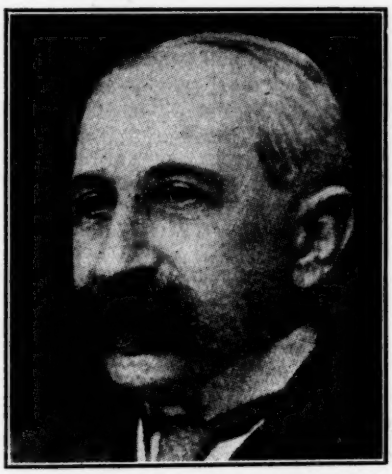
SIR FELIX SEMON*

HIS CONTRIBUTION TO LARYNGOLOGY

BY

R. SCOTT STEVENSON, M.D., F.R.C.S.Ed.

Felix Semon was born in Danzig on December 8, 1849, the son of a substantial merchant. He was educated at Heidelberg and at Berlin, and took the Berlin M.D. in the summer of 1874. His training had been interrupted by the Franco-Prussian War of 1870–1, when Semon served as a "one-year volunteer" in the Prussian Uhlan Guards, seeing some active service. After graduation he went on to spend a postgraduate year at Vienna and London, studying particularly the various specialties. In London he visited the chief teaching hospitals, finally attaching himself to the medical wards of St. Thomas's, where an old friend of his mother's, Richard Liebreich, was in charge of the eye department. Semon also attended the Brompton Hospital, Moorfields, and the Throat Hospital, Golden Square; at the last he had a letter of introduction to its founder, Morell Mackenzie, from an old friend of Mackenzie's, Fürstenberg, of Berlin. Laryngology was then a brand-new specialty, with exciting new methods of diagnosis and treatment presenting themselves almost every month, and Semon determined to embrace the opportunity presented in London, attending Golden Square Hospital with redoubled zeal.



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In March, 1876, Semon approached Mackenzie to know what his views would be if he were to stay on in London, and Mackenzie kindly promised him that as soon as possible he would get him appointed a physician to Golden Square Hospital—this less than a year after he had come to England. He passed the M.R.C.P. examination in October, 1876, was elected to the old Royal Medical and Chirurgical Society, and began private practice at 6, Chandos Street.

*A shortened version of a paper read at a meeting of the Osler Club on December 1.

In the peaceful and spacious days of Queen Victoria it was no disadvantage in London to be German. Queen Victoria herself liked to converse in German, as she had done with her dear Prince Albert, and it may be remembered that King Edward VII spoke with a marked German accent and numbered some Germans among his intimate friends. Musical London—and those were the great days of Melba and Caruso, Joachim, Rubinstein, and Paderewski—was dominated by the German element. Semon was a good pianist and a composer of ability, and made many musical contacts among his fellow countrymen.

Felix Semon undoubtedly made his mark as secretary of the Subsection of Laryngology at the great International Congress of Medicine in 1881. He was the most active of the secretaries and managed the affairs of the Subsection in a masterly manner, and by the time the Congress was over everyone in Europe or America associated with laryngology was well acquainted with his name. In 1882, backed by his friends MacCormac, Bristowe, and Ord, though not without some opposition, Semon was made head of the throat department at St. Thomas's Hospital, and was the first laryngologist to be appointed to any general or teaching hospital in this country. In 1884 he founded the *Centralblatt für Laryngologie*, published in Berlin, for many years the leading laryngological journal.

In any matter of laryngological interest he took a leading part. He was knighted in 1897, and when he retired from active practice in 1911 he was at the zenith of his career. The £1,200 that had been subscribed by friends and colleagues as a testimonial on his retirement he applied to endow the Semon Lectureship in Laryngology.

Cancer of the Larynx

Semon prided himself chiefly on his work on cancer of the larynx; in his autobiography he claims "the world's record for laryngeal cancer, 80% of lasting cures." But his idea of a "lasting cure" was a patient who survived for one year after operation. He includes in his cases patients whom he diagnosed but did not operate upon, and the 80% refers to laryngo-fissure patients only. Semon insisted that a malignant growth was more common in the posterior part of the vocal cords—this is quite wrong, and helped to mislead a whole generation. He said that a malignant growth caused greater hoarseness than an innocent growth, and that impaired mobility was an early sign of cancer of a vocal cord. All of these points Semon used to try to discredit Morell Mackenzie in his management of the case of the Emperor Frederick III—yet subsequent experience has shown that he was wrong in every one of them. It is true, however, that Semon's advocacy of the operation of laryngo-fissure did much to advance the surgery of cancer of the larynx. But it was Sir Henry Butlin, not Semon, who revived the previously discredited operation of laryngo-fissure, and Semon was wise enough never to attempt the operation without a skilled surgical assistant. Semon's contribution to advances in the study and treatment of cancer of the larynx is mainly that of an ardent propagandist, undoubtedly useful in the times in which he flourished, but his work in this field has had little permanent value.

Semon did good work in advocating complete vocal rest in the treatment of laryngeal tuberculosis. He read a paper, with a long and detailed report of seven cases, at the Berlin Laryngological Society in 1906, and subsequently published it in the *British Medical Journal*. But the idea dates back to Broussais in 1824, and Professor Moritz Schmidt, of Frankfort, advocated it in 1887, while others claimed to have done so about the same time.

Innervation of the Larynx

Before Semon laryngologists had quite chaotic ideas about laryngeal paralysis, and whether the abductors or the adductors were affected seemed to depend entirely on chance. Semon published many papers on the innervation of the larynx and laryngeal paralysis, and there is no doubt that he did clear up many misconceptions on this subject. He was not a trained physiological worker, and his early experimental work was unsuccessful, as he himself says, owing to deficiencies in technique; but after he made the acquaintance of Victor Horsley in 1884 he found a helpful collaborator, experienced in physiological investigation, and Semon's enthusiasm with Horsley's skill produced fruitful results. Semon's observation that in progressive organic lesions the nerves supplying the abductor muscles of the larynx are affected before those of the adductors has been termed "Semon's law." The name became attached mainly because Semon wrote so much and so vehemently on the subject when it was first promulgated. The idea had been in Semon's mind, he had said something about it at the Clinical Society of London in 1878, and in the German edition of Mackenzie's great textbook, *Diseases of the Throat and Nose*, translated and annotated by Semon, he elaborated this in a footnote, but Professor Otto Rosenbach actually published his own observation about the abductors and adductors in 1880 before Semon. The battle of priority was fought with considerable violence on both sides and a bitter controversy ensued.

Semon's main contribution to laryngology really lies in his having enhanced the status of the specialty. His published work, though much of it is naturally out-dated, was founded on personal observations and always carefully documented. He was an assiduous attendant at meetings of societies and conferences, and, at home and abroad, was in his generation looked upon as the representative English laryngologist—though in the end he preferred to print his collected papers (in two handsome volumes) in German. His geniality and courtesy, his generous hospitality and vivacious conversation, made him a conspicuous figure and a general favourite in the society of late Victorian and Edwardian London. He was undoubtedly vain and self-centred, but he was a hard worker and lived for the advancement of laryngology. The centenary of his birth well deserves to be remembered.

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Speaking on "The Need for Smoke Abatement" at the Royal Institute of Public Health and Hygiene on November 30, Sir George Elliston said that a report recently issued by the Federal Health Authority in Washington on last winter's fatal smoke fog in Donora—when over 20 people died and 40% of the population were made ill—showed that the chief culprit was sulphur dioxide, the corrosive constituent of our own fogs. "About the same time, here in London, a week of fog sent up deaths by 20 to 30% over the average for the previous four weeks, while the number of deaths from bronchitis was more than doubled." Those whose lungs were not as efficient as they might be should be warned to take special care of themselves and to remain indoors as much as possible during heavy smoke fogs. Discussing the remedies for the problem, Sir George said there was no simple panacea. The remedies were identical with the needs and programme for using our fuel supplies more efficiently and wisely and with the improvements that were so badly needed for warming our homes. He referred to the need for new legislation based on the prior approval of new fuel-burning installations, which was now standard practice in the U.S.A. and elsewhere overseas. The domestic smoke problem for a long time seemed to be insoluble. But in 50 years' time or less the old-fashioned coal fire would be as obsolete as the open sewer to-day. The abolition of smoke by stages through the setting up of expanding smokeless zones was preferable to any of the more spectacular ways that might be envisaged. Smokeless zones were areas where all smoke was prohibited, and though the central and administrative areas were an ideal starting point it was hoped that new residential districts, rebuilt blitzed areas, new industrial estates, and above all new towns would become smokeless zones. In time the separate zones would coalesce and whole cities and industrial districts become smokeless.

SCIENTIFIC TREATMENT OF DELINQUENCY

INSTITUTE'S ANNUAL MEETING

The eleventh annual general meeting of the Institute for the Scientific Treatment of Delinquency was held on November 18, with Dr. Edward Glover in the chair. Dr. Dennis Carroll, who presented the annual report, said that the year had probably been the busiest and most successful in the Institute's history. The clinic, on the council's recommendation, had become a part of the National Health Service, the Institute remaining a private society pursuing its other activities. This necessitated a division between the clinical and non-clinical work, and the placing of the clinic under the North-West Metropolitan Regional Hospital Board.

After mentioning a number of developments Dr. Carroll described one which had attracted a good deal of attention —namely, play therapy as a method of dealing with highly aggressive children between the ages of 8 and 11. Some of these children in ordinary life were dangerous, and all were aggressive enough to be regarded as uncontrollable. They were set to play in a specially designed room with materials that could cause no injury, and were allowed to be as aggressive as they liked; it took two adult play-therapists to control four aggressive children. The children also received individual treatment. After a few months they spontaneously became constructive instead of destructive, and were transferred to another room where they could be constructive to their hearts' content. This technique was still in the experimental stage in the sense that its limits were not yet known, but it was established that it was worth doing. Dr. Carroll complained that children were often not referred until they had a history of some years of delinquency, which made it necessary not only to overcome the original cause but to exorcise an extremely bad habit.

The Earl of Feversham said that the stage had been reached when the conscientious citizen was aware of the work which had grown up at the Institute. People were at last beginning to ask why children were naughty, and once the beginning of an answer to that question was made the problem of juvenile delinquency began to be solved. He thought it a great advantage that the work of the clinic had been taken over by the National Health Service and the Institute left free for research and education, even though its appeal to the public was now less dramatic.

ENCEPHALITIS AND ENCEPHALOMYELITIS

HUGHLINGS JACKSON LECTURE

The Hughlings Jackson lecture was delivered before the Section of Neurology of the Royal Society of Medicine on November 22 by Dr. J. G. Greenfield, whose subject was "Encephalitis and Encephalomyelitis in Man." Mr. Julian Taylor presided.

Dr. Greenfield, whose lecture was accompanied by many photomicrographs of brain sections, said that he could find no evidence that Jackson took a special interest in this subject. Perhaps acute cases of this kind did not lend themselves to the detached and protracted study which he gave to his cases, but if his working life had been twenty years later the sequelae of encephalitis would have fascinated him, and no doubt his keen analytical mind would have clarified the problems they presented.

Encephalitis had now largely passed into the hands of virus experts, and in this field the laboratory worker had recently outstripped the clinician. But the reverse side of the picture, that of the histopathologist, showed five or six different types of encephalitis which had so far resisted attempts at transmission to animals, or at least had given uncertain results. In the diagnosis of these cases the histopathologist retained an important place. The lecturer confined himself to the forms of encephalitis which were, or might be presumed to be, due to infection by a virus either directly or by reaction of virus and host in a manner not yet fully understood. He gave a short historical survey of encephalitis in man from the sixteenth century onwards. Towards the end of the nineteenth century the chief interest in encephalitis was in relation to influenza. Pfeiffer's bacillus was incriminated in many cases. Acute haemorrhagic encephalitis was almost synonymous with influenzal meningitis. The state of knowledge in England was well summed up by Frederick Batten early in this century. Batten recognized encephalitis following measles and other acute infectious diseases, and stated that influenzal meningitis might give rise to symptoms very similar to those of encephalitis. At that time there seemed to be little conception of encephalitis as an independent disease.

In the epidemic of encephalitis lethargica in 1917 the most curious symptom noted was the lethargy or light coma. Its sequelae of oculogyric crises and parkinsonism were not known to follow any other form. On the whole, the course of this disease was less acute than that of other forms of encephalitis, though many acutely fatal cases did occur. It seemed that we were still ignorant of the virus causing encephalitis lethargica, possibly because no suitable animal host had as yet been found. In this disease the white matter of the hemispheres was little if at all infiltrated; the basal ganglia often showed severe lesions.

Cases of encephalitis following vaccination against smallpox began to be observed in 1922. These were at first interpreted as a direct attack on the brain by a vaccinal virus. It was not long, however, before cases of encephalitis with a similar histological picture were observed following measles in the larger centres of population, and other cases following influenza, rubella, chicken-pox, and mumps were recorded. The aetiology of this condition had to be reconsidered. One possibility was activation of another virus that was capable of causing demyelination or necrosis. Another was an allergic response of the brain to the previous infection. By 1930 cases of post-vaccinal encephalitis had become rarer, but they became rather more numerous during the recent war. This post-infectious form of encephalitis, though rare, was still the most common type in the British Isles at the present time.

Meanwhile various epidemics had been happening, or were about to happen, some of them in the Far East and the Antipodes, others in America. Dr. Greenfield gave some account of the Australian X and Japanese B forms. In the late summer of 1933 an epidemic occurred in St. Louis, with a low death rate and practically no sequelae. It appeared to be carried by mosquitoes, probably from an animal or avian reservoir, in which it was probable that the disease was carried through the winter by mites or ticks. In 1938 outbreaks of equine encephalomyelitis were reported from the eastern seaboard and the western States of the U.S.A. That in the east was small, but with a high death rate in children. In the western States the epidemic was widespread and the condition had now become endemic. In all five of these forms the disease occurred only in the late summer, when mosquitoes were most numerous.

An outbreak of encephalitis in East Russia, occurring in spring and early summer and noticed about 1932, was found by a commission of investigation to have been carried by ticks from the wild animals in Siberia to the human population. Not uncommon also in the western area of Russia were cases of a progressive or relapsing type in which the peripheral musculature was more affected than the shoulder-joints and neck, which were most often affected in the Siberian cases.

Epidemics of the insect-borne forms of encephalitis were determined as to their seasonal incidence by the life habits of the insect vectors. But there were several other factors affecting the epidemiology, the first being the establishment of immunity both in the human and animal hosts. Just as in epidemics of poliomyelitis there were many cases without paralysis for every case of paralysis, so here there were many cases of fever only for each case which showed neurological symptoms. The phenomena of interference and exaltation of virulence, one or the other of which might occur when two viruses were combined, had also to be considered.

Encephalitis in the British Isles

Dr. Greenfield then passed to a specific consideration of the various forms of encephalitis in the British Isles at the present time. Some were quite rare, such as acute cases of the pan-encephalitic type, of which during the last eight years he had

examined only ten from different parts of the country. In most of these cases attempts were made to transfer the disease to animals, but without success. The cases were found generally in adolescents or young adults between the ages of 15 and 35. The intensity of the inflammatory changes in the brain varied remarkably.

Cases of acute haemorrhagic leuco-encephalitis had recently been reported in Boston, Mass., and in Norway. Some of them were interesting in that the disease was almost entirely in the pons or brain stem. Most of these cases came on after infections of the respiratory tract, such as sore throat, influenza, coryza, or acute bronchitis. In one patient he had personally examined the symptoms came on two days after an attack of urticaria, the history suggesting an allergic reaction of the brain tissue. The onset of the condition after influenza or an acute respiratory infection, sometimes with an interval of a few days of relative health, suggested a possible relationship between this condition and the commoner form of post-infectious encephalitis, and this was borne out by recent experimental work.

Subacute forms of encephalitis presented a rather distinctive clinical course. He mentioned eight cases of subacute inclusion-body encephalitis in children. The disease came on gradually, sometimes over a period of weeks, and pursued a ruthlessly progressive course to a condition of complete loss of mentality. At an earlier period of the disease, in all but one of the cases studied, myoclonic jerking movements or repeated spasms of the face or limbs or of the entire body had been observed. Death had occurred after an interval of from seven weeks to six months from the first symptom.

The subacute sclerosing form of encephalitis described by van Bogaert in 1945 was not easily distinguished from the subacute inclusion-body type on clinical grounds. In it also there was progressive dementia with involuntary movements which might resemble those just described or might be of a writhing character. In both subacute forms the cerebrospinal fluid, though otherwise normal, might give a Lange reaction of paretic type. Histologically the sclerosing form showed neuroglial proliferation and early gliosis in the cortex and areas of partial demyelination with gliosis in the white matter. In both forms the usual evidences of inflammation were found in the cerebrum and brain stem.

The lecturer closed by saying that the belief that encephalitis might occur in a subacute progressive form, although suggested by some of the earlier cases, had only recently been fully documented. Few had worked in this field, but it was one which was full of interest and offered a rich harvest.

At the close of the lecture Professor Ludo van Bogaert, of Antwerp, offered a few observations. He agreed with the lecturer that the two subacute forms he had described were clinically indistinguishable. He had recently found several such cases in colonies of mental defectives. A vote of thanks to Dr. Greenfield was proposed by Dr. F. M. R. Walshe, who said that the Hughlings Jackson lectureship was the highest honour which British neurology could offer to anyone working in this field. The lectureship had always been filled by a most distinguished neurologist, but this was the first time that neuropathology had had the honour. Dr. Greenfield's contributions to neurology over the last thirty years were well known, and in moving the vote of thanks he had the double satisfaction of paying a modest tribute to Dr. Greenfield's distinction in his chosen field and of expressing his affection for a man whom he had known for so many years.

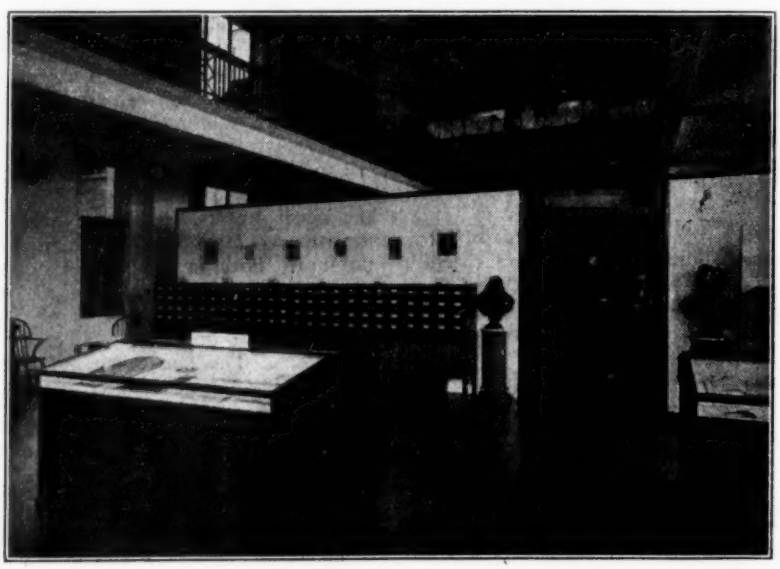
WELLCOME HISTORICAL MEDICAL LIBRARY

The Wellcome Historical Medical Library was formally opened on December 2. Welcoming the guests to a luncheon given by the Directors of the Foundation, Mr. H. E. Sier (chairman) said it was a great privilege to see there so many librarians, representing most of the large libraries in England. He spoke of the late Sir Henry Wellcome's great interest in medical history and archaeology, which had led him to build up the library. Dr. E. Ashworth Underwood (Director of the Library and Museum) recalled that Sir Henry had by 1900 acquired a considerable collection of museum pieces and books, and in 1913 he was able to provide a medico-historical exhibition at the International Congress of Medicine in London. Considerable progress had been made in the preparation of the library catalogue, and he paid tribute to the Librarian, Mr. W. J. Bishop, and his staff for their achievement in bringing the library to its present state of efficiency. Sir Arthur MacNalty and Sir Henry Thomas also spoke.

The Library

The library has been built up in the last 50 years on a scale comparable, in its own subjects, to that of the great national collections. It contains 200,000 books, pamphlets, and journals, 5,000 manuscripts, and 100,000 autograph letters. It includes 612 complete works and 22 fragments of books published before 1500, which is one of the largest collections of incunabula in the country. Among these are to be found Aristotle's *Problemata* (1500), of which there is only one other copy in existence, and his *De physico* (1500). The copy of Quiricus de Augustis: *Lumen apothecariorum* (1497) is the only one in any British library. Other titles include Avicenna's *Canon* (1489–90), Ferrarius de Gradibus: *Consilia* (1482), Gilinus: *De morbo gallico* (1497), the only copy in Britain, and Hippocrates: *De natura hominis* (1480).

The sixteenth century is represented by 4,000 volumes, including the Renaissance editions issued by Aldus, Froeben, the Estiennes, Junta, Oporinus, and other scholar printers. The library contains all the editions of Vesalius and his forerunners, the works of Jerome of Brunswick, Hans Gersdorff, Ambrose Paré, Paracelsus, Della Croce, Pierre Franco, Vidus Vidius, Marianus Sanctus, and other pioneers of surgery. There are to be found on the shelves rare early herbals by Dioscorides and the well-known Mainz Herbal of 1491.



Among the 700 English books printed before 1640 are Gilbert's *De Magenu* (1600), Roesslin's *Byrth of Mankinde* (1540) and Vigo's *Surgica Works* (1586) autographed by William Clowes, the Elizabethan surgeon. The seventeenth-century collection contains 10,000 books, including not only such medical works as Harvey's *De Motu Cordis* (1628) but first editions of Bacon, Galileo, Kepler, Descartes, Newton, and Boyle.

The library contains special collections on, for example, alchemy, occultism, veterinary

medicine, and folklore, mediaeval texts, and original manuscripts from such figures as Hunter, Pasteur, Lister, and Florence Nightingale. There is also a large collection of modern works.

The library is now open at the Wellcome Research Institute, 183, Euston Road, between 10 a.m. and 5 p.m. from Monday to Friday throughout the year, apart from the usual Bank Holidays.

Reports of Societies

METHODS OF PREVENTION IN PSYCHIATRY

Professor T. FERGUSON RODGER, of the Department of Psychological Medicine, Glasgow University, addressed a meeting of the Leeds Regional Psychiatric Association in Leeds General Infirmary on November 18. The meeting was arranged by the subcommittee on education and public relations of the association, and Professor D. R. MACCALMAN was in the chair.

Professor RODGER described his experiences as a member of the subcommittee on mental health of the World Health Organization and discussed the principles for mental health organization which this subcommittee had formulated. The committee was representative of psychiatry in Britain, the United States, China, Czechoslovakia, Brazil, and India. The facilities for psychiatric treatment throughout the world were surveyed and found to be generally inadequate to meet the demand—grossly so in Asiatic countries. In these circumstances the need for preventive measures was paramount; yet even in the advanced countries prevention was a relatively new field. The most suitable field for the development of preventive services was in the public health service, which would have to establish an organization equivalent to that already provided for dealing with the problems of communal physical health. Mental hygiene departments of the kind visualized would require the assistance of research workers in sociological and psychological aspects of the work. The international subcommittee regarded mental health work among university students as of great importance, since the majority of these individuals would hold responsible positions in the community.

In the course of the discussion which followed methods of prevention in psychiatry were described. The need for instruction in the aims and methods of psychiatry for influential laymen, such as industrialists, trade union officials, and teachers, was emphasized. The importance of the health visitor, her influence on parents, and her part in conveying knowledge on the management of children was stressed.

The U.S. Public Health Service has recently made grants amounting to nearly $1,000,000 to aid laboratory and clinical research. The awards were made by the National Cancer Institute to hospitals and universities in 21 States. With the aid of these funds several of the institutions will investigate the relationship of cancer and hormones. Drs. R. W. Rawson and H. J. Tagnon, of the Memorial Hospital, New York, will study the role of human liver in reducing the activity of oestrogen. The investigators will make use of sections of human liver which have had to be removed in the course of treatment for various diseases, including cancer, with a view to finding out if liver from patients with and without cancer differs in ability to make the hormones inactive. In earlier studies liver from patients with cancer of the uterus failed to inactivate oestrogen. Thus a damaged or diseased liver may contribute to the development of cancer in organs stimulated by hormones. A tracer study of "cortisone" will be supported through a grant to the St. Louis University School of Medicine. By tagging cortisone with radioactive carbon, the investigator, Dr. E. A. Doisy, will trace the drug through the bodies of laboratory animals, in order to learn its path and mode of action. Previous studies by Dr. Doisy, a Nobel Prize winner, have shown that less than 10% of administered cortisone is excreted in the urine, but the remainder has not been accounted for.

Correspondence

Silico-tuberculosis

SIR,—Dr. H. Midgley Turner and Dr. W. J. Martin's paper on mortality and survival rates in males with silicosis and silico-tuberculosis (November 19, p. 1148) is of great interest and value, but one essential piece of information is omitted. We are not told the grounds on which the two conditions were distinguished. It might be concluded from the tables that 50% of cases of silico-tuberculosis aged 40 have a chance of reaching the age of 58. If the diagnosis of silico-tuberculosis were based on positive bacteriological findings this is an astonishing conclusion, unless the majority of such cases were diagnosed long after the age of 40 and assumed to have been tuberculous since that age. Presumably, therefore, the diagnosis was based upon other grounds, which should be stated.

I am quoted as suggesting that in pneumoconiosis of coal-miners "clinically tuberculosis appears as an infrequent but often serious complication of the disease." It is the belief of myself and my colleagues that massive fibrosis in coal-miners' pneumoconiosis is nearly always the expression of tuberculous infection in a lung that is already affected by simple pneumoconiosis.[1] If this is correct, tuberculosis is a common complication of coal-miners' pneumoconiosis. It is serious in that it leads to considerably more disability than simple pneumoconiosis and ultimately in many cases to death from respiratory failure. A positive sputum in such cases is, however, uncommon: Stewart[2] found it in about 3% of her cases. When the sputum is positive the man is usually ill and seldom survives more than two years. Out of 13 cases with a positive sputum whom we have studied as in-patients up to two years ago, only one survives to-day. Thus, in coal-miners' pneumoconiosis at any rate, the diagnosis of "silico-tuberculosis" is a serious one. It only becomes grave when the sputum is positive.

Turner and Martin also state that the prognosis of silico-tuberculosis in coal-miners is better than the prognosis of comparable cases in grinders. It would again be interesting to know whether they mean comparable bacteriologically or comparable radiologically. Owing to the profound differences in the method of deriving the figures their tables are not comparable with those produced by Stewart[2] for the survival of certified cases of coal-miners' pneumoconiosis, but her figures suggest a very much graver prognosis for cases of coal-miners' pneumoconiosis after certification (which in most cases is the time at which symptoms lead the man to seek medical advice) than that given for all cases of silico-tuberculosis by Turner and Martin.

I feel there are grave disadvantages in Turner and Martin's method of deriving prognosis by extrapolation into the past and that Dr. Stewart's figures may be more helpful to medical men concerned with cases of coal-miners' pneumoconiosis.—I am, etc.,

Penarth, Glamorgan. C. M. FLETCHER.

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Treatment of Ringworm of the Scalp

SIR,—Dr. K. D. Crow, in his letter (November 19, p. 1175) in which he discusses local versus *x*-ray treatment of tinea tonsurans, lists a series of disadvantages of the latter method and quotes nine cases of incomplete regrowth after epilation that I have reported in 2,400 epilations. May I set some of these disadvantages in their proper background?

1. It is surely unusual for cases of ringworm of the scalp to have to wait 3–4 months for *x*-ray treatment. This certainly does not apply to London. We have no waiting-list at Goldie Leigh Hospital.

2. The risk of permanent alopecia is now extremely remote in properly organized radiotherapy centres. The nine cases I

reported all occurred in September and October, 1927, when the apparatus available was primitive, and the dosimeter still more so. Since then I have treated 2,350 cases at Goldie Leigh Hospital without a single mishap.

3. Dr. Crow is wrong in stating that *x*-ray epilation is unsuitable for young children. We treat children from one year upwards. Those who are too young to remain still of their own volition can be simply and safely restrained on the couch I described in 1931.

I agree that if the local applications advocated by Brain and his colleagues (April 17, 1948, p. 723, and September 17, 1949, p. 626) are successful they should be used in preference to epilation, but in assessing the alternatives the difficulties and dangers of the *x*-ray methods should not be presented as serious when in fact they are now negligible.—I am, etc.,

London, W.1. S. COCHRANE SHANKS.

Aureomycin in Treatment of Syphilis

SIR,—Dr. R. R. Willcox has shown (November 12, p. 1076) that this drug has some action in early syphilis. This was already known. I deprecate the unscientific trial of therapeutic agents in syphilis, and the premature publication of results.

In syphilis, more than other diseases, therapeutic trials must be planned and controlled, and deductions must be based on scientific tests and prolonged observation. The prevalent abuse of antibiotics in syphilis is fostered by unscientific trials and premature reports.—I am, etc.,

Manchester. ROBERT LEES.

Botulism or Polio-encephalomyelitis?

SIR,—I have read with interest the comments of Drs. E. Vivian Lambert and A. H. Gale (November 26, p. 1235). Certain features of this patient's illness made a diagnosis of poliomyelitis very unlikely: two members of the family had similar prodromal symptoms; the interval between onset of gastro-intestinal symptoms and paralysis was only a matter of hours; signs of meningeal irritation were absent; and an isolated internal ophthalmoplegia occurred. The course of the illness was therefore quite unlike poliomyelitis.

Dr. Gale rightly draws attention to the care taken by manufacturers of canned food. The tongue which came under suspicion in this instance was canned in South America.—I am, etc.,

London, W.1. DAVID KENDALL.

Inspection of Coarctation of Aorta with a Thoracoscope

SIR,—Under the heading of Medical Memoranda in the *Journal* of August 6 (p. 317) there was a report from Mr. J. R. Belcher and Dr. F. E. de W. Cayley of a case of direct inspection of coarctation of the aorta with a thoracoscope, in which they stated that there had been no previous description of a coarctation of the aorta seen through a thoracoscope or the use of this instrument as a means of identifying abnormalities of the great vessels in the thorax.

In August, 1947, a female patient aged 31 had been referred to me with a view to having Smithwick's thoraco-lumbar sympathectomy performed for hypertension. She had been married for eight years and had three children. She had been told that her blood pressure was high during her second pregnancy four years previously. Her present symptoms were referable to her hypertension, the blood pressure being in the neighbourhood of 225/110 mm. Hg when taken in the left arm. These symptoms had been present for about three years, and consisted mainly of palpitations of the heart and breathlessness on exertion, with throbbings in her throat. She had never had any headaches. Examination of her nervous system did not reveal any abnormality, but an early "silver wire" appearance was noted in the arteries of the ocular fundi. The patient's heart was somewhat enlarged, and there was a systolic murmur, best heard at the mitral and pulmonary areas. Marked pulsations were noted in the arteries of both posterior triangles of the neck, in the axillae, and at the back between the scapulae. The blood pressure in the right thigh was only 140/110 mm. Hg. Skiagrams of her chest were taken by Dr. B. P. Anderson Stuart, who reported that the aortic knob was present but that he could not detect any shadow of the aortic arch behind it, nor of the descending aorta. There was definite notching of the under-margins of many of the ribs, and radiologically the appearance was pathognomonic of aortic coarctation.

In order to be certain of the diagnosis and to determine whether the patient should be submitted to operation for this condition or not, in view of her age, it was decided to "let down" the lung on the left side by performing artificial pneumothorax on three occasions. Thoracoscopy was then carried out by inserting a Jacobeus thoracoscope through the fourth intercostal space at the anterior axillary line. The lung was seen to be collapsed and a huge subclavian artery noted, into which the arch of the aorta seemed to terminate. The internal mammary artery and the upper three intercostal arteries were seen to be about three times their ordinary size. As the lung was not completely collapsed, the descending portion of the aorta could not be seen, but the stricture appeared to be just beyond the origin of the left subclavian artery. The patient did not suffer any ill effects from this procedure and the lung expanded in a few days.

As I had had no experience with this operation, and as no other surgeon in Sydney at the time had had any either, it was decided not to advise any surgical measures then. Her case was subsequently discussed with Dr. O. T. Claggett, of the Mayo Clinic, and in view of the appearances seen at thoracoscopy and the age of the patient he stated that he would not advise any surgeon to operate on this patient as his first case. The position was fully explained to the patient and her relatives, and she is still leading a fairly normal existence and her symptoms have not progressed.

This thoracoscopy was actually performed on September 3, 1947, in the department of neurosurgery at the Royal Prince Alfred Hospital, Sydney, where the full records of the case are available.—I am, etc.,

Sydney. R. A. MONEY.

The Acute Throat

SIR,—I was very surprised at Dr. Thomas Anderson's reply (November 19, p. 1179) to the criticisms of his article on the acute throat. From the point of view of the clinician surely his own clinical observations must count for something. I agree that the majority of sore throats are mild and tend to subside naturally, but I am sure that many practitioners have seen these mild throats, treated them with aspirin, etc., and then have seen them, say, two or three days later very much worse. In these cases we have lost valuable days. The incidence of peritonsillar abscess in my practice has fallen enormously over the last few years, and I can only account for this by sulphonamide therapy instituted early on.

I would like to know just what preparation of sulphonamide was used by Dr. French in the investigation on scarlet fever mentioned by Dr. Anderson. I know that some similar researches were done with sulphanilamide years ago but have not been repeated with the recent and better preparations.

The majority of G.P.s do not make a positive diagnosis of *streptococcal* tonsillitis. There are other bacteria which are responsible for sore throats—e.g., pneumococci and staphylococci—and many strains of these organisms are amenable to the recent sulphonamides.

So far as the necessity of treating mild tonsillitis at all arises, I feel that the mild cases rarely come to the doctor at all. Would Dr. Anderson still agree that milk-borne tuberculous infection should be permitted because of the immunity it may produce? Surely if we have a potent weapon we should use it.

As regards drug rashes, these also can be caused by aspirin as well as the sulphonamides. Of polyarteritis nodosa I can say nothing, never having seen a case, but I certainly have not heard of any great increased incidence from my colleagues.—I am, etc.,

Dagenham, Essex. J. FINER.

SIR,—Dr. T. Anderson, in his excellent article on "The Acute Throat" (October 15, p. 860), repeats the traditional advice for the treatment of throat infections—"the administration of aspirin powder, which is allowed to melt slowly in the mouth before swallowing." The implication is that aspirin taken in this manner exerts its analgesic effect both locally and centrally. Dr. Anderson mercifully omits any reference to the common

but futile practice of gargling with a suspension of aspirin powder before swallowing it. The pain and irritation caused by the powder coming into contact with an already inflamed mucous membrane are the exact opposite of the effect intended—unless the intention be to bring about rupture of a peritonsillar abscess without surgical intervention by causing bouts of violent coughing. Is there in fact any evidence that aspirin exerts its analgesic effect by virtue of a local, as well as a central, action?—I am, etc.,

Kuala Lumpur, Malaya. G. SCLARE.

Failed Forceps

SIR,—May I support the view of Mr. W. P. Hirsch (November 19, p. 1179) about the importance of transverse arrest of the head in difficult forceps deliveries? The so-called "persistent occipito-posterior position" is in most cases a transverse arrest of the head. Some figures which I am at present preparing for publication show that in forceps deliveries the transversely arrested head is far more common than the persistent occipito-posterior position and carries a much higher foetal risk. In the real occipito-posterior position a deliberate face-to-pubes delivery can and should be carried out in most cases, and the foetal risk is low, as a relatively safe cephalic grip is obtained with the forceps.

Mr. Hirsch rightly points out that there is quite inadequate mention of this position in the standard textbooks in this country. It is usually looked upon as an occipito-posterior position in which incomplete rotation has taken place. Mr. Hirsch mentions, however, that the head enters the brim in the transverse diameter in 40% of cases, and some American radiological studies indeed place the figure at 60% or more. If the transversely arrested head is not an occipito-posterior position, and in the majority of cases never has been one at any stage of labour, surely these two complications should be separated, especially as their treatment is so different.

The classical operation in these cases is that of manual rotation. I believe, however, that not only is this usually impossible but that attempts to carry it out are dangerous. The fault in these cases is not that the head has failed to rotate but that it has failed as a result of pelvic deformity to reach that level at which rotation normally occurs. The use of the Kielland forceps in these cases is highly satisfactory with practice, as deep general anaesthesia is unnecessary. A cephalic grip is obtained, and there is a minimum of manipulation. Spontaneous rotation usually occurs during descent.—I am, etc.,

Middlesbrough BRYAN WILLIAMS.

SIR,—Many years ago I attended a lecture on forceps deliveries in persistent occipito-positions and was amazed at the number of different theories and treatments suggested in the discussion that followed. Not being convinced by any one of these, I looked up all the available literature and found that practically the only agreement in the various descriptions was that the cause of the persistent occipito-posterior position was insufficient flexion of the head.

As a student I was taught to treat the cause of any condition, not the result. I have, therefore, since that time treated all my persistent occipito-posterior cases by flexion of the head. This is very easy to do with three fingers on the occiput, and as soon as the head starts to flex rotation takes place. This has been verified by the many house-surgeons and general practitioners to whom I have explained it.—I am, etc.,

Bristol. MABEL F. POTTER.

Sudden Obesity and Psychological Trauma

SIR,—The interesting report on three cases of "sudden obesity and psychological trauma" by Drs. H. J. Shorvon and John S. Richardson (October 29, p. 951) prompts me to ask for a very pertinent information which is lacking in the case histories. Is there a familial (hereditary) tendency to obesity in these three patients? If so, the interpretation of the pathologic mechanism involved would require some modification.—I am, etc.,

Los Angeles. JULIUS BAUER.

An Unusual Murmur

SIR,—The following case history may be of interest to your readers, as it presents unusual and remarkable features.

A medical practitioner, aged 27, while sitting on a chair engaged in conversation, was suddenly seized with an attack of pain in the praecordium. The character of the pain was that of an ache, it passed from the praecordium to the inferior angle of the left scapula. It was not very severe, but some five minutes later it became worse and changed its character to that of an acute sharp pain, which at times seemed to involve the left shoulder-joint. So severe was the pain at this stage that the patient decided to rest for a while in his bedroom. On arriving at his room he lay on the bed and, taking his stethoscope, listened to his heart. He heard a distinct clicking noise, and for a moment thought that the bell of the stethoscope was hitting against one of his shirt buttons. This was not the case. The noise was coming from his chest. He called for a servant, who fetched his assistant, who arrived after about 10 minutes. By this time the noise was so loud that it could easily be heard without a stethoscope; now however it was not clicking in character but harsh. It was systolic in time, and absolutely regular. It would fail with every extrasystolic intermission, and return with every normal systole (the patient has had extrasystoles for years). At this point the patient noted that the pain was not continuous but throbbing. It too came with every systole, and failed during the extrasystolic intermissions. Thus the pain, the noise, and ventricular systole occurred together. A remarkable feature was that suddenly, and for no apparent reason, the noise would stop, only to return after an interval of about ten to twenty seconds. During these periods the heart sounds were normal.

Examination at this stage revealed a normal blood pressure, a heart rate of 80, and an apex beat which was strong and in its normal position. Apart from the peculiar noise, which by now could be heard some 12 ft. (3.5 m.) from the bed, and the pain there was nothing else abnormal discovered. Next day the pain had disappeared. The patient was examined by a surgeon, who excluded diaphragmatic hernia, and by a physician, who suggested as a diagnosis haemopericardium, pericarditis, or coronary thrombosis. On the next day various radiological examinations were performed, but no abnormalities were discovered except for a slight increase in the size of the left ventricle. An E.C.G., B.S.R., and blood count were performed: the E.C.G. showed extrasystoles, otherwise everything was normal. Another physician was called to the case, and coronary thrombosis was diagnosed. Three days after the onset of the attack the noise disappeared.

On returning home the patient spent one month in bed, during which he felt well except for an occasional ache over the heart, and at times a sharp pain in the left elbow where the ulnar nerve crosses the medial epicondyle. After his month in bed the patient arose and on his second day up he had another attack, exactly as the first but not so severe. It disappeared after three days. The patient then saw another physician, who said that while he could not make a diagnosis he could exclude coronary thrombosis; he added that the heart was in no way at fault. On his advice the patient returned to work. Since then there have been two or three minor attacks, but so slight were they that it was not necessary for the patient to discontinue his work. Mediastinitis, with mediastinal emphysema, was the patient's ultimate diagnosis.

—I am, etc.,

St. Matthews Hospital, South Africa. F. A. WARD.

Malignant Tertian Malaria

SIR,—With regard to Sir Philip Manson-Bahr's letter on the subject of malignant tertian (subtertian) malaria (November 5, p. 1044) I fail to see why criticism of textbook teaching on the subject should be regarded as "betrayal of truth." It is no reflection on early observers of malaria to suggest that they did not reach finality in the matter of symptomatology and diagnosis any more than they did in the matter of treatment and other aspects of the disease. For instance, the textbook I mentioned (October 22, p. 930), and most others, twenty-five years ago was teaching that it was necessary to take large amounts of quinine over long periods to cure a simple attack of malignant tertian malaria, a belief which presumably was also not arrived at "in a day," but which has been found to be fallacious since then.

The view of M.T. malaria as being an extremely "protean" disease—a great imitator of other diseases—which I believe has been emphasized by Sir Philip more than anyone else, is no more sacrosanct. My contention is that experience in the

Tropics in the past twenty to thirty years has proved it to be capable of modification, to say the least of it. The emphasis has shifted from credulity to scepticism about very unusual behaviour on the part of M.T. malaria. There has been a general increase of knowledge about malaria as well as other tropical fevers, knowledge of its epidemiology and immunology, particularly in relation to native races. Laboratory methods have improved. All this has had its effect on the clinical approach to M.T. malaria. Nowadays a native with M.T. parasites in his blood and pneumonic symptoms is not likely to be labelled "pneumonic malaria," when it is appreciated that most members of his tribe and district carry M.T. rings in their blood as part of their normal equipment, so to speak. It is surely not unreasonable to suppose that early textbooks and descriptions of the disease might have been affected by lack of this kind of knowledge.

Any views I have put forward would not be found at all remarkable or heretical by scores of practitioners in the Tropics to-day. They are, moreover, not based on "flitting" experience, but on twenty years' recent residence in malarious districts of Kenya, as good a "pitch" for observing the behaviour of the disease, I would think, as anywhere else.—I am, etc.,

Craven Arms, Shropshire. P. ROSS.

Angioneurotic Oedema Caused by a Wasp-sting

SIR,—We feel that the following account of angioneurotic oedema consequent on a wasp-sting may prove of interest, and we would welcome advice or comments with reference to the case.

The patient, a man of 48, in good health, received a sting on the scalp from a wasp. He informed the medical officer, who was in the same room at the time, and as an erythema of the face and neck was already developing he was given 75 mg. of "benadryl." He returned to his work and began to notice a marked irritation in his legs, moderate dyspnoea, and huskiness of the voice. From then onwards the condition progressed rapidly, his dyspnoea became pronounced, and he could only speak in a whisper.

When next seen by a medical officer (about 20 to 30 minutes after the original sting) he was markedly cyanosed and had urgent dyspnoea. His face, lips, fauces, tongue, and glottis were oedematous, his conjunctivae suffused, and his eyes watering copiously. He had clinical evidence of pulmonary oedema, and his respirations were "bubbling" in type. There was a uniform erythema of his body, and scattered urticarial weals were present in his skin. His pulse was 120 per minute and of a very poor volume. He could just speak in a husky whisper, and complained of a constrictive pain across the lower part of his chest and gross skin irritation.

The condition was treated by an immediate subcutaneous injection of 8 minims (0.5 ml.) of liq. adrenalin, followed by 1 minim (0.06 ml.) per minute thereafter. By the time 16 minims (1 ml.) had been given his symptoms were improving sufficiently for him to be moved from a chair to a couch. A marked limb tremor of a coarse type had developed at this time, and continued at intervals for 1½ hours. During the course of the next few hours he was given further subcutaneous injections of adrenaline (2 minims) at about 30-minute intervals, and also a further 50 mg. of benadryl and, later, "antistin."

He fell into a deep sleep, the respiratory obstruction having been dramatically relieved by adrenaline, and by evening (approximately eight hours later) had little in the way of abnormal physical signs other than a persistent oedema of the uvula, which was causing some retching. A further 4 minims (0.24 ml.) of adrenaline helped to relieve this. By the following day he was sufficiently well to return to light duty, his duties being of a sedentary nature.

The interest of this case lies in the fact that the patient had sustained a sting on the left ring finger three weeks previously. This was apparently from a bee, as the sting had to be removed from the skin. The reaction that followed this was entirely local, consisting of an oedema and urticaria of the dorsum of the hand and of the lower third of the forearm. This settled in about three days with benadryl, rest, and local treatment. The patient gave a history of always reacting rather severely to insect bites. He has been stung only once before by a wasp (on his foot); this was some years previously.

It would appear that in the present instance the initial bee-sting provided a sensitizing dose, and during the three weeks' interval hypersensitivity developed, the second sting (though apparently from a different type of insect) being the "shocking" dose. It is interesting in this connexion to note that there was no local reaction to the second sting, the manifestation being entirely of a general nature.

An alternative explanation is offered by the work of Feldberg and Kellaway,[1 2 3] who showed that certain bacterial toxins and snake venoms which damage tissues may cause histamine to be liberated when they are perfused through the lungs. As in this case the two stings were almost certainly from two different insects, the one a bee and the other a wasp, it is possible that some toxin in the sting of the latter caused a histamine reaction in the body. Otherwise one must postulate that there is a specific protein common to wasp- and bee-stings, or that the original sensitizing dose was the sting sustained on his foot some years ago.

The problem which clearly presents itself is that of possible prophylactic treatment. Whitby[4] states with reference to anaphylaxis following serum therapy that "it is as well to assume that all individuals become hypersensitive ten days after the injection of any foreign serum and remain so for the rest of their lives." Presumably in our patient there is hypersensitivity to some protein associated with the insect's sting, and in the event of it not being possible to desensitize him, as seems more than likely, the only alternative would appear to be for him to be constantly armed with a hypodermic syringe and some adrenaline if and when he is not near to medical aid and for him to be instructed how to inject himself should the need arise.—We are, etc.,

W. R. S. PANCKRIDGE.
C. Q. HENRIQUES.

Dartmouth, Devon.

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The Natural History of Asthma

SIR,—I feel that many of your readers must have shared my feeling of disappointment in the article entitled "The Natural History of Asthma" by Drs. Elsie O. Williams and G. E. O. Williams (October 22, p. 897). From the title I had, I think not unreasonably, expected to find therein the answers to at least some of the perplexing questions presented by this disorder. It was not clear to me whether their article was in fact based on a review of medical records or whether they had taken histories from, examined, and treated these patients themselves. If they have personal knowledge of these cases, it seems to me inexplicable that they have not been struck more forcibly by certain aspects of the natural history of asthma which have been widely described in the medical literature, and which have seemed to me inescapable. If, on the other hand, their paper was based solely on the examination of medical records, I submit that the natural history of any disease, and in particular any psychosomatic disease, cannot be adequately described by such a method.

I am primarily interested in the psychosomatic aspects of asthma, and I do not feel that this has been adequately dealt with in this paper. Asthma is only one symptom which occurs in individuals who through heredity or constitution exhibit the allergic diathesis. This diathesis manifests itself not only through the familiar somatic disorders, such as asthma, hay-fever, eczema, etc., but also through a particular personality pattern and the tendency to develop specific neurotic behaviour patterns. That such personality patterns and their associated neuroses occur in allergic subjects has been shown in the writings of many authors, notably French and Alexander[1] on asthma, Wittkower[2] on hay-fever, and Rogerson[3] on the asthma of childhood.

As long ago as 1913 Marcinowski[4] wrote the following, "Only the method of psycho-analysis, however, has enabled us to come nearer to the essential nature of asthma and see the absurdity of the old [*sic*] clinical distinction between bronchial and nervous asthma. The various successes of somatic therapy do not in any way argue against the psychogenic concept. The pedagogic value of other procedures, such as breathing exercises, can be denied as little as the sedative value of drug therapy by narcotics. But in the future we shall consider as the true causal therapy only the treatment of the basic anxiety hysteria." For my own part, I would not be prepared to go so far in dogmatism as Marcinowski, for I consider the allergic factor in the aetiology of asthma as beyond doubt. I

do believe, however, that the symptoms of the majority of cases, though commencing as allergic phenomena, are gradually replaced in part or in whole by neuroses of the anxiety type.

Rogerson[3] stated in his article on the asthmatic child that there was an unusual quality in the relationship between the child and one or both of the parents. I subscribe to this view, but I feel that the effective parent in the relationship is usually the mother. Asthmatic children are abnormally dependent on their mothers, who in their turn are abnormally over-anxious about the asthmatic child. That this is a special relationship between the mother and the asthmatic child is demonstrated by the fact that such mothers do not appear to be over-anxious about the siblings, and may indeed treat them with a scant regard which is beneficial to their mental health. A quite extraordinary relationship develops between the mother and the child, in which she suffers from anxiety and the child from asthma. So long as he remains the centre of the stage he appears to remain free from anxiety, but should the position of pre-eminence, largely achieved through his asthma, be threatened he will respond with either anxiety or, what is now an established conditioned reflex, the asthmatic attack. Gradually a situation develops between the child and his mother in which the child values his special relationship so much that he finds it impossible to surrender it in order to achieve his ultimate needs.

I have found it valuable in these circumstances to approach the problem primarily through an attempt at resolving the maternal neurosis, for I have found that if the mothers can achieve insight into their psychological position *vis-à-vis* the child their anxiety may be lessened and their treatment of the child modified with beneficial results. I feel that this simple therapy should preferably be carried out by the physician who has charge of the case, and that only more complex cases require expert psychiatric treatment. It could be argued that the physician may find the time required a limiting factor. If this is so, recourse might be made to treatment on group lines. Sixteen or so mothers would form a convenient group which could be introduced to the simpler psychological aspects of asthma and allowed latitude to discuss their problem in personal terms. I would further suggest that the first group meeting may be profitably devoted to the question of the physical over-protection to which asthmatic children are subjected. Any physician who is acquainted with an asthma clinic will recognize the unfortunate child in three woollen vests, pullover, overcoat, and scarves, who looks out of place in midsummer amongst his more suitably attired fellows. It should then be a simple matter to introduce the psychological over-protection.

One further feature of asthma which, it appears to me, was inadequately dealt with in the paper under discussion is its episodic nature. Many children appear to "grow out" of asthma. I think it remains unknown why there should exist such wide variation in this respect, but it has been in my experience a striking feature of the disorder. It is because I feel that these important considerations should not be overlooked when we consider the natural history of asthma that I have presumed on your valuable space.—I am, etc.,

London, E.11. D. H. IRWIN.

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Gangrenous Intussusception in Childhood

SIR,—Dr. D. J. Conway and Mr. R. L. G. Dawson (November 19, p. 1153) describe two cases of gangrenous intussusception treated by the Mikulicz method. Although both cases were brilliantly successful the authors mention certain disadvantages: (1) wasting; (2) excoriation of the abdominal wall; and (3) further operative procedures for closure. In order to obviate these I would most strongly advocate the manœuvre first suggested by Woodhall.[1] This consists in making a side-to-side anastomosis between ileum and colon just above the exteriorized gut. This adds little to the time of the operation and leads to a much smoother recovery.

I have recently done this in two successful cases and found that 90% of the intestinal contents was passed per rectum. This meant that there was very little dehydration with all its attendant difficulties in the infant and only slight excoriation around the wound. In addition, subsequent closure was easier than after the simple Mikulicz procedure.—I am, etc.,

Southampton. L. A. RICHARDSON.

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Chemistry of Trace Elements

SIR,—It has long seemed to me surprising that so little work has been done on the micro-chemistry of the rheumatic disorders. Yet we have much evidence to show that the trace elements, in excess or in deficiency, are important in many human and animal diseases in this group.

I have just read a note on cobalt poisoning, from which I learn that the toxic effects are attributed to interference with tissue metabolism due to fixation of sulphhydryl groups. It has been noted that the administration of cysteine lessens this toxic effect. A similar beneficial effect from the use of cysteine or of sulphur has been noted in rheumatoid arthritis. Clinical improvement occurs, coinciding with an increase in the cysteine content of hair and nails.

I have tried to find out whether the distribution of cobalt in the soils of this country coincides with that of rheumatoid arthritis. Hitherto I have been unable to get the necessary information. I do nevertheless suggest that investigations on these lines might prove fruitful, not only in reference to cobalt but also to many other trace elements.—I am, etc.,

Hadley Wood, Herts. G. C. PETHER.

Splenic Puncture

SIR,—I was interested to read of Dr. E. Tuckman's method of splenic puncture (November 12, p. 1112), as it is almost exactly like the one I used in India for the diagnosis of kala-azar, except that I kept the plunger of the syringe withdrawn while removing the needle. This caused the splenic pulp to spatter into the barrel, which was then washed down with a millilitre or so of isotonic saline into a small tube and spun at a low speed. Thick smears were made of the deposit and stained by Simeon's method.

It was my experience that when parasites were scanty the spleen was more likely to reveal them than the sternal marrow. It was very important, though, to make a prolonged search for Leishman–Donovan bodies if other findings are suggestive. I remember particularly the case of an Anglo-Indian in whom marrow examination revealed no parasites, but a single Leishman–Donovan body was found in two of three thick smears of his splenic pulp.—I am, etc.,

Ashford, Middlesex. C. F. ROSS.

Paraffin Pneumonia

SIR,—I am prompted by Dr. M. Gelfand's article on paraffin pneumonia (November 19, p. 1151) to recall a case of an East African soldier who was under my care in a military hospital in Egypt in 1946.

A man of 24 was brought in as an emergency. He was in a deep coma. There was a total flaccid paralysis. No physical signs could be found in the respiratory system. Urine N.A.D. I noticed a strong smell of paraffin in the breath of the patient, and on inquiry among his tent mates it became clear that he had been drinking a fair amount of paraffin taken from his hurricane lamp and mixed with lemonade. A gastric lavage was carried out, and he was placed in an upright position. Within 24 hours he was conscious and his neurological signs had subsided. He then developed a high temperature and a productive cough. There were no definite physical signs in the chest, but the radiograph showed widespread broncho-pneumonic patches of "snowstorm" type. His sputum was repeatedly negative for tubercle bacilli. A course of penicillin was given, following which he made an uneventful recovery, and the *x*-ray appearances became normal within a week.

This case would correspond to group 3 in Steiner's classification (*Amer. J. Dis. Child.*, 1947, **74**, 32).—I am, etc.,

London, S.E.13. G. Z. BRETT.

Painful Experiments

SIR,—Most of us in the profession, myself included, have probably at some time or other derided the charges of cruelty made by antivivisectionists against the experimenters in our ranks. It has been the custom to ease our consciences, probably in genuine belief, by dismissing the charges as the outpourings of cranks who in any case were not aware that painful experiments were conducted only on the anaesthetized animal.

Within recent years, however, there has been genuine cause for disquiet, and the experiments on conscious rats described under the section headed "Effect of the Alarm Reaction" in the paper appearing in the opening pages of the *Journal* of November 19 (p. 1129) must surely arouse misgivings in the minds of some of us who were given to scoff.—I am, etc.,

Leighton Buzzard, Beds. M. C. ROTHCOPE.

Infestation with Trichostrongylus

SIR,—I have just read Dr. Ian S. Stewart's article (October 1, p. 737) on trichostrongylus infestation. I now believe this infestation to be a common disease among the Mauritians recruited into the British Army. I have kept no records, but treat about one case of "hookworm" a week. Personal experience in the examination of stools has convinced me that many more cases pass unrecognized through my hands. One may examine a stool carefully for over half an hour and find one ovum just as the search is being given up after numerous slides have been examined. And several stools may be negative before an ovum is found.

With one exception none of these men has been anaemic. Their symptoms have been abdominal; had they been otherwise stools would probably not have been examined. They were all treated with tetrachlorethylene and oil of chenopodium. No adult worms were recovered after treatment, though ova seemed to disappear, at least for a while. They were then discharged from hospital.

In one case adult worms were recovered after treatment. This man had a haemoglobin of less than 3 g., and subsequently recovered completely. In this case numerous ova had been found in the stools and their development into larvae had been typical. In the other cases ova were scanty and fully segmented. Their development neither resembled that of *Strongyloides* ova nor of *Ankylostoma*—certainly not the former.—I am, etc.,

Benghazi. D. HAMILTON.

Death by Hanging

SIR,—When a malefactor was hauled up to the bough of a tree the presumption is death was by strangulation, although pressure on the jugular veins causing cerebral congestion may have induced unconsciousness before death supervened. A similar anaesthesia was induced before disembowelling in the sentence of hanging, drawing, and quartering.

But about a century ago the questions Dr. F. A. Richards (November 26, p. 1235) asks and the misgivings he feels—whether or not any of the rest of us share his ideas—arose for the very practical reason that too many criminals were being revived after execution, even though they had been left hanging the prescribed period. It was becoming common for the friends or relatives, or even an inquisitive surgeon, to have a hackney coach ready and whisk off the body immediately it was cut down, usually to a tavern, where a vein was opened and, if any blood flowed, restorative measures were applied. From these occurrences it was concluded that the drop used, in contradistinction to the more primitive method, was too short, and the present long-drop method was substituted with the direct object of breaking the neck. The ideal, I was informed as part of my medical education many years ago, is for the odontoid peg to break the odontoid ligament and drive into the medulla, destroying the vital centres.

Reports of post-mortem findings published in accounts of inquest proceedings frequently leave in doubt whether this is achieved; but fracture of two or three of the upper cervical vertebrae is invariably mentioned. Dr. Richards's crushed cervical cord appears in actual fact to be a much more complete destruction than anything which can be quoted as an example of compression of the cord; and if an actual pulping of the medulla is not achieved it is difficult to see how the vital centres can retain any activity when there is such widespread destruction and consequent direct violent alteration of pressure just below.

One would agree that the present method, or any conceivable method, of hanging does not cause instantaneous death, because the adjective is inapplicable to any mode of death known to man; but it approaches instantaneousness much more closely than any other method, even shooting, unless in that method a bullet actually traverses the medulla. And even in such a case the wound of entry presumably causes some momentary knowledge of injury before the vital centres are destroyed. Electrocution is sometimes considered to be as quick as lightning, but it is understood that early mishaps with this method, including some arising from using too high a voltage, have led to the use of three successive shocks, and, therefore, which causes death cannot with certainty be determined.—I am, etc.,

London, S.W.6. C. T. NORRIS.

The G.P. and E.C.T.

SIR,—I believe that our hospital is the only place in Cornwall where E.C.T. is applied, thus I think it almost my duty to join in the controversy started by Dr. Donald M. O'Connor, of Launceston (October 29, p. 984). The percentage of relapses among my patients during the last five years is very small, I could say negligible, though I do not deny that some needed a second course of E.C.T., and still less few a third course. With this confession I should like to combine a citation from Dr. Robert Thompson's letter (November 19, p. 1178), with whose statement I am in complete agreement. He asks, "What is wrong with a second course of E.C.T., or even a third?" Here it is worth while to state that in the U.S.A. an average course of E.C.T. has 20 shocks (not 6–10), not to mention weekly maintenance doses lasting one year and longer.

The letter of Dr. J. Ernest Nicole (November 12, p. 1116) stresses an important point. It is true that E.C.T. alone is not always a cure in itself, and after-treatment is necessary in many cases. This brings me to a fact not fully appreciated yet. It is an established fact that patients—say, with an injury of a leg and some resulting disablement—are not only given time of convalescence but also, and what is more important, rehabilitation facilities, by means of which they are taught to rely again on their injured limb. Are patients who sustained an injury to the most sensitive organ in the body—the cerebrum—not in need of and entitled to rehabilitation?

I too believe that the impact of everyday life, without gradual preparation for it, is at least one of the main causes of many relapses. Much has been done and much is done in our hospitals; nevertheless under present conditions convalescent wards in many hospitals cannot replace convalescent homes and still less rehabilitation centres. There, apart from necessary maintenance doses of E.C.T., I visualize patients being taught to rely on themselves again. The return to everyday life and to the original conditions and circumstances—often a big part in the causal mosaic—will, properly guided, be done gradually and, I think, with lasting effect even in cases which at present tend to relapse.—I am, etc.,

Bodmin, Cornwall. ERNEST E. FELDMESSER.

Poisoning by Ferrous Sulphate

SIR,—May I offer a footnote to the article by Dr. J. H. Prain (November 5, p. 1019) and to your annotation (p. 1034) on poisoning by iron pills? It is desirable that not only the patient who possesses tablets of the "fersolate" type but the doctor also who prescribes them should be aware of the danger.

In a recent case, when a child of 14 months swallowed 44 tablets, the practitioner was consulted within five minutes and again after an hour and a half: he said that there was no danger and that the baby would be perfectly all right. At the inquest he regretted his error, with the explanation that the tablets were

not listed in the textbooks as a poison, and no antidotes were recommended for an overdose. The makers' container itself, of course, bears a warning; it should be remembered that a pharmacist supplying them on prescription does so in a plain packet.—I am, etc.,

HENRY PORTER.

POINTS FROM LETTERS

Asthma at Sea

Dr. G. L. ALEXANDER (Bristol) writes: It is commonly assumed that a voyage to the Antipodes is wholly good for health. Many find to their cost that this is not so, noticeably asthmatics on the large crowded liners. The first night out from Tilbury they are smitten with the worst attack they have ever had. This does not respond to their usual remedy, repeated large doses of adrenaline being required for even partial relief; and it is days before recovery is complete. On arrival at the Australian coast, down they go again, and they have a bad time crossing the Bight. Some have nearly died. Practitioners would do well to advise their asthmatic patients bound for Australia to fly if they can afford it; otherwise to consult the ship's surgeon as soon as they get aboard, as there are various ways in which he can help them.

Treatment of Rheumatic Fever with Antihistamine Drugs

Dr. L. A. QUIRK (London, W.1) writes: It is over two years ago that I first used the antihistaminics in a case of rheumatic fever—apparently with good results. I tried them in a second case, and again was impressed favourably. Later I was informed by a physician at a Vancouver (British Columbia) hospital that pyribenzamine was used routinely in cases of rheumatic fever admitted to that hospital. . . . As it would appear that theoretically the antihistaminics are the logical treatment for rheumatic fever, and because of the importance of this disease in general practice, may I urge you to let us general practitioners have some information on the results of investigations at an early date ?

Confusion with Tablets

Mr. B. A. LEVINSON (London, W.1) writes: From the patient's standpoint I have frequently noted with apprehension the absence of warning or even identifying marks upon barbiturate and other dangerous tablets. A recent incident prompts me to address you on the subject. My doctor prescribed pethidine and "amytal." My chemist supplied them, each box being marked, in the words of the prescription, "to be taken as directed." How was I to know which was which ? I guessed, and guessed wrongly. The chemist, to whom I went for identification, took a little time himself to distinguish between the two. . . . I do not intend any expression against either doctor or dispensing chemist, but I venture to suggest to physicians that when prescribing such tablets they should add a direction to the chemist to mark the container with the name of the contents or some other adequate indication of their nature.

Firework Injuries

Mr. F. KEITH HAYMAN (Sharnbrook, Bedford) writes: Having read Mr. L. A. H. Snowball's letter (November 26, p. 1236) may I suggest a very simple safeguard ? A conspicuous "A" or "U" could be printed on the firework or, if too small, on a strong tab firmly attached to it, thus conforming to the already well-known cinema-film classification. An obligation could be laid on the manufacturers to mark their products in this way, and on shops to sell only "U" fireworks to children. This could easily be arranged by Government regulation, if the suggestion could be conveyed to the right quarter.

Health and the Soil

Dr. ANGUS CAMPBELL (Edinburgh) writes: I was very interested to read the letter (November 19, p. 1178) by Dr. G. T. Wrench entitled "Health and the Soil." My late teachers at Edinburgh, George Lovell Gulland, Professor of Medicine, Edinburgh, and Sir Edward Sharpey-Schafer, Professor of Physiology, Edinburgh, both described the work of Sir Robert McCarrison, and predicted that the work which he had begun would lead to very great changes in the lives and health of the people. These lectures are now some thirty years old, and very little seems to have been done in the way of following out this great work. It is difficult to see why this great work has not advanced as far as its merits indicate, but the secret seems to lie in the one word "fragmentation." Dr. Wrench describes the answer admirably as the "interdependent whole." To be fair to the Minister of Health one must admit that he is trying to spread the idea of healthy living rather than the bottle of medicine and that he follows out this idea by encouraging action. But I agree with Dr. Wrench that by concentrating on the present ailments of the people we will never reach perfect national health.

Obituary

JOHN ORR, M.D., F.R.C.P.Ed.

Dr. John Orr, who died at Edinburgh on November 28 in his 79th year, was for 21 years dean of the School of Medicine of the Royal Colleges in Edinburgh, where he taught the class of materia medica up to 1945. He was educated at George Watson's College, for which he retained a high affection during his whole life, being twice president of the Watsonian Association. He qualified M.B., Ch.M with honours from Edinburgh University in 1891, and in 1896 took his M.D. and was elected a Fellow of the Royal College of Physicians of Edinburgh. He chose general practice as a career, and after a long and busy life retired nearly 20 years ago. He was then free to devote his interest and energy to medical education and teaching, in which he had always been greatly interested. To gain wider experience and insight into these subjects he visited medical schools in the U.S.A., Canada, and India. He became dean of the School of Medicine of the Royal Colleges in Edinburgh in 1924. He was a member of council of the Royal College of Physicians of Edinburgh from 1926 to 1930, and acted as their representative on the board of managers of Edinburgh Royal Infirmary. He was a former senior president of the Royal Medical Society of Edinburgh. Dr. and Mrs. Orr celebrated their golden wedding early this year, and great sympathy will be extended to his widow.

Lieutenant-Colonel A. D. Stewart writes : By the death of Dr. John Orr in his 79th year the medical profession of Edinburgh has lost a very distinguished member—and not only the medical profession. Like many other doctors he had wide interests and activities outside his chosen career. He had a deep knowledge and appreciation of classical music, and he took a lively interest in the provision of symphonic music in Edinburgh. He was a keen and expert bowler and curler, and he had a real love of Classical and English literature. His administration of the School of Medicine of the Royal Colleges of Edinburgh was particularly successful, and it was largely due to his interest and ability that the school came successfully through difficult periods until it was taken over by the University in 1948. His interest and kindness and ready help will be remembered by many generations of students. He gave long and devoted service to the board of managers of the Royal Infirmary of Edinburgh, on which he served for over 20 years. The department of radiology strongly interested him, and he was largely responsible for the development of this important and essential side of the hospital's activities. The secret of John Orr's success lay in the sterling qualities of his mind and character. It is given to few men to live as long and as complete a life as his. Nature had gifted him with good health and an abundance of physical and mental energy, a clear reasoning mind, an acute intellect, and a cheerful and optimistic outlook on life. He had as a foundation a simple but high religious faith, and from this sprang many of the qualities of his character. Dr. Orr will be remembered by us as a great servant of the Royal Infirmary, as an outstanding example of one who used to the full the opportunities afforded by the voluntary principle to serve unselfishly and unstintingly a great voluntary institution, and through it a whole generation of his countrymen. Those who knew him and shared his friendship will remember him as one who was kindly, courteous, and wholly sincere.

Dr. JAMES DEWAR, who died on September 1, was born at Mullingar, in Southern Ireland, on November 22, 1883. His father was the late Elliot Paxton Dewar, Head Inspector of Schools in Ireland. James Dewar was educated at Lurgan College and at Queen's College, Belfast, where he graduated in 1907. In 1911 he came to Bury as assistant to the late Dr. France. In the first world war he served as medical officer to the 5th Battalion Durham Light Infantry, returning to Bury in 1919. He then took over the practice of Dr. France, one of the biggest in Bury, and carried it on until his death. He was police-surgeon to the county borough from 1919 to 1948. The cares of a large industrial practice allowed him little leisure, and latterly his only hobby was the collection of antiques. In his younger days he was interested in rugby, cricket, and rowing. James Dewar's charm of manner endeared him to all his many patients. His industry enabled him to carry on the large practice to which he had succeeded. His loyalty to his medical colleagues, his unassuming modesty, and his native Irish wit were notable. He died, as he would have wished to die, in harness, but he will long be remembered.

The Rev. Dr. GEORGE BROCKLESBY DAVIS died in Cambridge on November 5 at the age of 76. Dr. Davis was the son of the Rev. Brocklesby Davis, and was born in Allahabad in 1873. He was educated at Corpus Christi College, Cambridge, and later at Ridley Hall, where he read for Holy Orders. As a student of the London Hospital he qualified in 1904. After taking a curacy at Forest Gate he joined the Church Missionary Society in 1905, and from then until 1919 he served as a medical missionary at Amritsar, in India. He was in charge of the C.M.S. Hospital at Amritsar for many years, and he served many of the outlying village hospitals and dispensaries also. At the same time he continued his ministry as a priest of the Church of England in the little mud churches scattered over a wide district. Early in his career in India he learnt from the famous Colonel Smith the intra-capsular technique of cataract extraction, and he performed hundreds of operations on Sikh and other patients. He was also responsible for an extensive programme of inoculation against plague, and he taught scores of Indian dressers and dispensers minor medical and surgical procedures. Dr. Davis, perhaps on account of his equable temperament, was always known to his Indian patients as "Firishta Doctor Sahib," which means roughly "Angel Doctor." In 1911 he married the daughter of the Rev. Charles Howard. When he returned to England in 1919 Dr. Davis brought his wife with him and the first five of his subsequent family of eight children. He was in practice in Ely for 25 years, for most of them in partnership with Dr. K. S. Maurice-Smith. In 1931–3 he was chairman of the Isle of Ely Division of the B.M.A. He was medical officer and public vaccinator for Ely, Trinity, and Little Downham, and medical officer to the Ely Dispensary and Poor Law Institute: His health broke down in 1945, and thereafter he was partially paralysed and lived in retirement in Cambridge. He was much loved by the people of Ely and was never known to refuse to answer a call from the Fens, even in the worst weather. He was an able general practitioner and a skilled obstetrician, and he will be remembered as a man who gave invaluable service to the community in which he worked, both in India and in Ely.

Dr. WILLIAM BRANDER, who died on November 21 in London at the age of 73, graduated M.B., Ch.B. at Aberdeen in 1901. He proceeded M.D. with the highest honours in 1910 and Ch.M. with distinction in 1922. He took the M.R.C.P. in 1937. He served in Firvale Hospital, Sheffield, then a Poor Law hospital, for some years before becoming medical superintendent of Hackney Hospital in 1911. This post he held until October, 1929, when he was appointed principal medical officer in charge of the general hospitals division of the London County Council. He retired from office on account of ill-health in 1936. Soon after his retirement he went to Egypt. He was still there at the outbreak of war and was unable to return. Throughout the war years and for the early post-war period he wandered over eastern Africa, from Egypt to the Cape and back again, in an unavailing search for a climate that would suit him and relieve his bronchitis and emphysema. In due course, after the war, when transport became available and when he was well enough to travel, he returned to this country, but from the time of his return his health was such as to enforce on him a quiet and retired life. His absence in Africa for so many years and his seclusion after his return took him out of public life and away from professional contacts. Every period is in a sense a transitional period, but it fell to Brander in exceptional measure to deal with rapid changes and developments. He was at Hackney during the years after the first world war when many of the Poor Law hospitals made rapid advances in response to the increasing demands which were being made on their services. Hackney Hospital under Brander was in the forefront of these changes. Then with the Local Government Act of 1929 the London County Council assumed control of the Metropolitan Asylums Board hospitals and also of all the hospitals in London formerly controlled by the twenty-five Boards of Guardians. It was quite a big job to take over the M.A.B., but the M.A.B. after all was already an organized hospital service. It was Brander's task to deal with hospitals, mostly general, which had been under twenty-five different managements, hospitals varying in size, in function, and in development. He was also concerned with epileptic colonies and nurseries and his duties included the administration of the district medical work, which until 1948 played such an important part in the medical care of the poorest people of London. He was responsible, too, for the supervision of the medical services in the Public Assistance Institutions. Brander bore the brunt of this stupendous task. He worked very hard and there is little doubt that this contributed to his ultimate breakdown in health. Without Brander's help Sir Frederick Menzies would have found very much more difficult the task, which he carried out so well, of moulding and developing the municipal hospital service of London. Dr. Brander's academic distinctions indicate his intellectual quality, and his clinical experience was exceptionally wide. He was a very good all-round doctor. It is true that much of his professional time was devoted to administrative problems, but he was a better and a wiser medical administrator because he had been first of all a good doctor. The interests of the patient were always his first interest, and it is noteworthy that he was especially concerned that the chronic sick should receive proper care and consideration. Brander was indeed a canny Scot—his opinions were formed slowly and hesitantly but once formed were always sound, and his advice was highly valued. As a man he was friendly, sympathetic, and generous, a charming companion and a loyal and helpful colleague. His loss will be mourned by all who worked with or for him. He leaves a widow who has devoted herself to his care, especially since his breakdown in health, and a son who is a banker in North Africa.—A. D.

Dr. WILLIAM MURRAY CAIRNS died on November 28 at his home in Wallasey at the age of 83 years. The son of a Liverpool cotton broker, he was born in that city in 1866 and educated at the Liverpool Institute and Edinburgh University. He qualified in 1891, and graduated M.D. in 1915. Shortly after qualifying he was for a time surgeon in charge of the English Presbyterian Mission Hospital in Formosa. He returned to Liverpool in 1896, where he established himself in practice and also took a great interest in local medical affairs. Dr. Cairns was a life member of the Liverpool Medical Institution, which he joined in 1897. During his membership he held the offices of secretary in 1919–21, vice-president in 1922–3, and he was made a trustee in 1922. He took a great and active interest in the work of the St. John Ambulance Association, being county surgeon to the Brigade and also chairman of the Liverpool Centre. During the 1914–18 war he was medical officer in charge of the St. John auxiliary military hospital in Liverpool. His services were recognized by the conferment of the C.B.E. in 1920, and ten years later he was made a Commander of the Order of St. John of Jerusalem. Among his other appointments was that of specialist medical officer to the local education committee in regard to the examination of physically defective children, and he was also an examiner in medicine to the General Nursing Council. He had been a member of the

British Medical Association for the past 46 years, and up till recently he took an active part in its work.

Dr. E. S. A. Ashe writes: I was surprised to see that among all the appreciations of the late Professor T. P. McMurray (November 26, p. 1236) no mention was made of the fact that he was not only a brilliant orthopaedic surgeon but a brilliant general surgeon as well. I had the honour to be his house-surgeon, and my wife also, and we have vivid recollections of how on more than one occasion he would turn round at the end of a long operation list of orthopaedic cases and operate on a case of acute intussusception which had been brought in as an "emergency." It was fascinating to watch those surgically beautiful hands one moment wielding an osteotome to shiver a bone and the next, by the most gentle pressure, reducing the seemingly irreducible intussusception. Of McMurray it might be truly said: "He was a man who went about doing good and healing all manner of sickness."

Medico-Legal

LIBEL ACTION BY MR. MATTHIAS ALEXANDER

In March, 1948, an action for libel was brought by Mr. Frederick Matthias Alexander, of London, against three medical men: Dr. Ernst Jokl, Physical Education Research Officer to the Union Education Department, Dr. E. H. Cluver, Director of the South African Institute for Medical Research at Johannesburg, and Dr. B. Maule Clark, of Houghton, Johannesburg, editors of *Manpower*, a biannual scientific journal published in Pretoria by the Government Printer and circulating throughout the Union. The evidence in this case was reported at length in the *Journal* of March 20, 1948 (p. 575), and the written judgment of Mr. Justice Clayden was summarized in the issue of May 8, 1948 (p. 909). Mr. Alexander was awarded £1,000 damages and costs because of an allegedly defamatory article which appeared in the March, 1944, issue of *Manpower*. The defendants entered an appeal.

Judgment on Appeal

Dismissing the appeal with costs,[1] the Chief Justice said that because the trial court had found that it had not been proved that Mr. Alexander's system was entirely worthless, counsel for the appellant doctors had sought to use the evidence of the trial for the purpose of showing dishonesty on the part of Mr. Alexander. The sting of the defamatory matter which had to be justified was that Mr. Alexander knew that his technique was of no value to improve health or cure ill-health, and that he practised it dishonestly to exploit the rich. But, in view of the considerable body of evidence from medical practitioners and others who deposed to benefits derived by patients from his treatment, it was not possible to find that he knew that his technique was worthless and that he only used it to impose upon and exploit the rich.

Passing to the plea of fair comment, the Chief Justice said that there could be no fair comment upon facts which were not true. Counsel for the appellants relied upon the plea of fair comment only in respect of the passage in the offending article dealing with appendicitis. In that passage it was suggested that Mr. Alexander claimed to be able to cure acute appendicitis by means of his system, and the comment was that to give this type of advice was criminal. But the fact was that Mr. Alexander did not, in his books, claim that he could cure acute appendicitis.

As to the contention that in any event the damages awarded to Mr. Alexander by the Transvaal Provincial Division of the Supreme Court were excessive, the Chief Justice said that Mr. Alexander was entitled to compensation for his injured feelings and the hurt to his dignity and reputation. His reputation, in this case, included not only his good name from a moral and social point of view, but also his reputation as a teacher of his system of psycho-physical education. He was therefore unable to come to the conclusion that the damages awarded to Mr. Alexander for that injury were excessive.

[1] *Cape Argus*, June 3, 1949.

Medical Notes in Parliament

National Health Service (Amendment) Bill

The National Health Service (Amendment) Bill was read a third time in the House of Lords without debate on December 2. Consideration of the amendments made by the House of Lords in this Bill was set down for December 8 in the House of Commons.

The Nurses (Scotland) Bill

The Nurses (Scotland) Bill was considered on report in the House of Commons on November 30. On the first schedule (the General Nursing Council for Scotland) Mr. WOODBURN moved amendments to meet the wishes expressed during the committee stage that the Council should include a person with financial experience. Commander GALBRAITH thanked Mr. Woodburn for bringing forward the amendment, and it was accepted. The House then passed to the third reading of the Bill. In moving this Mr. WOODBURN said that on the committee stage he had been asked to give special consideration to the question of "fever nurse," including a nurse with tuberculosis experience. He had been unable to alter the Bill in any way, but he would take care to ensure that the members of the Nursing Council included a person with recent tuberculosis experience.

Sir THOMAS MOORE said the Bill would depend largely on its administration for its success. One of the ways by which nurses could be made happy and contented, and therefore efficient, was by the food they received. According to information from nurses who had received their training in hospitals which he would mention the food was disgraceful. That applied to Glasgow Royal Infirmary. Mr. WOODBURN submitted that the question of food in hospitals was not a question regarding training of nurses. Only training was dealt with in the Bill. If Sir Thomas had complaints of the kind which he had indicated he had better submit them to Mr. Woodburn for verification and not make a personal statement in the absence of verification.

The SPEAKER said the matter had nothing to do with the Bill.

Sir THOMAS MOORE said he did not withdraw his allegation, which had been made to him by a nurse. He accepted the Speaker's ruling and would not pursue the matter further. He believed the Bill was a good one and would have all the success which the House desired it to have.

The Bill was then read a third time. It had already passed the House of Lords.

Leprosy

Mr. SORENSEN on November 15 asked what further steps were being taken to deal with leprosy in Nigeria and other West African Colonies.

Mr. CREECH JONES replied that it was not possible to estimate how much of the total expenditure on medical services was devoted to the treatment of any particular disease. No statistics existed which would show reliably whether the incidence of leprosy was increasing or decreasing in West Africa. In Nigeria there was a fully organized Leprosy Service. Arrangements were being made for this Service to extend its activities from the areas in the south, where previously its intensive operations had been carried out, to the whole territory. Missionary bodies, already extensively engaged in leprosy work, were being brought fully into the programme. An experienced leprosy research officer had recently been appointed. A comprehensive scheme for the future had been drafted and was under consideration. This scheme involved heavy expenditure. The extent to which it would be possible to implement it would depend on the relation this expenditure bore to the needs of other social services and the finances of the territory as a whole.

Mr. CREECH JONES added that in the Gold Coast there were five refuges for lepers. A full-time leprosy officer and ten lay assistants had been appointed and had taken up their duties. It was intended that three lepro saria should be established to cover the country. Each would have accommodation for 2,000 patients. Native authorities would be helped to establish leprosy villages where the inhabitants would lead a normal life

under medical supervision from the nearest leprosarium. The rate of progress in implementing these proposals would depend upon the availability of medical staff of all grades, many of whom must be trained locally. In Sierra Leone a permanent form of organization for the control of leprosy was being planned. The co-operation of the Evangelical Brethren United Mission and the British Empire Leprosy Relief Association had been assured, and a grant had been made from the Colonial Development and Welfare funds. In the Gambia plans for the reorganization of Leprosy Services were well advanced. These included the construction of a new Government leprosarium, which would function as a training centre for local staff and also serve as a valuable instrument in propaganda. In both Sierra Leone and the Gambia progress was at the moment hampered by the difficulty of obtaining suitably qualified staff.

Calories

Mr. STRACHEY stated on November 21 that for the year ended last June the calorie figure for the United Kingdom was 2,980 per head per day, which, he said, was not significantly different from the pre-war figure of 3,000 calories per head per day. He added that the figures for the present rate of consumption might prove to be above the pre-war figure by a significant number of calories. He agreed that once up to the pre-war figure the calories had a limited significance and that variety and quality of food came in as important factors. Distribution was more equitable than it had been before the war. Consumption of fats was 98% of pre-war, of eggs 91%, of cheese 110%, of bacon 49%, and of liquid milk 157%. These figures did not include the recent increase in the bacon ration.

Pneumoconiosis in South Wales

In the House of Commons on November 24, opening a debate on Welsh affairs, Mr. JAMES GRIFFITHS said that the Silicosis Board no longer suspended a man with pneumoconiosis unless that disease was accompanied by tuberculosis. Diagnosis of the disability could now be made at a much earlier stage. The Board could, and did, recommend that men could continue in underground employment in approved conditions, subject to re-examination at intervals of not more than 12 months. This was an improvement on the old system by which men were given a certificate once, after which nobody bothered. It was too early to say the new scheme was successful, but it was encouraging. Steady progress was also being made in the application of methods of dust suppression. Dr. Fletcher and his team, in consultation with the Silicosis Board and the Pneumoconiosis Research Unit at Llandough Hospital, Cardiff, were conducting research into the diagnosis and treatment of the disease and into rehabilitation. The future of the South Wales coalfield depended on pneumoconiosis being overcome. Experiments in certain of the North Wales slate quarries in laying dust, particularly in the slate-splitting sheds, showed encouraging results.

Restricted Use of Operating Theatres

Colonel LIPTON and Mr. SWINGLER asked questions on November 24 about the reported restriction of the use of the operating theatre in a hospital or hospitals to the hours 9 a.m. to 5.30 p.m.

Mr. BEVAN said he was making inquiries.

Colonel LIPTON asked whether Lord Horder had not yet had the courtesy or the courage to substantiate the allegation which, in the absence of supporting evidence, would be regarded as irresponsible and possibly malicious.

Mr. BEVAN said he had made inquiries, and so far as he could find out the Ministry of Health had received no information whatever from Lord Horder before or since he made his statement.

The SPEAKER said that Colonel Lipton's supplementary question was an attack on a member of the House of Lords and should not have been made. There was no need in the question to mention any name.

Mr. BEVAN pointed out that the statement had been made by a member of the House of Lords but not in his capacity as a member.

The SPEAKER said that a very offensive supplementary question had imputed malice and that it was not in order for questions to be offensive.

Mr. BEVAN asked leave to point out that the original statement complained of was exceedingly offensive.

Mr. SWINGLER asked Mr. Bevan to consult with the Law Officers of the Crown to find out whether hospital administrators as a group could be protected in any way from unsubstantiated charges against unspecified hospitals.

Mr. BEVAN replied that the only defence and protection which administrators had, or, indeed, which the country had, lay in questions and answers in the House of Commons and in the publicity which was given to them.

Mr. WILSON HARRIS asked whether it was unreasonable that what might be termed routine operations should be confined to set hours provided that emergency operations could take place at any hour.

Mr. BEVAN said there were many inquiries to be made and there were thousands of hospitals. In the absence of detailed information he now had to circularize all the hospital management committees. Certainly it was perfectly reasonable for operating theatres to be closed during certain hours if they were always available for emergency operations, but the implication which had been raised was a reflection upon the National Health Service.

Mr. HENRY STRAUSS asked whether it was not premature, until Mr. Bevan had completed the inquiries promised by him in his original answer, to say whether the charge under discussion was substantiated or not.

Mr. BEVAN said that a responsible person, if he had thought that what he alleged was being done and was wrong, would have written to the Minister and given the name of the hospital in order that the Minister might make inquiries. Instead of that much anxiety, pain, and alarm had been unnecessarily given to many hundreds of thousands of people.

Replying to another question by Mr. SWINGLER, Mr. BEVAN said no instruction had been issued either by him or by any regional hospital board to any hospital to reduce the use of penicillin on the ground of expense. The matter was one entirely at the discretion of the doctor.

Mr. SWINGLER suggested that Mr. Bevan should courteously request a member of the House of Lords either to substantiate or to have the common decency to withdraw his allegation.

Mr. BEVAN said he did not propose to enter into any communication with the noble lord in this matter. If the noble lord would send him the precise information upon which he had based his very serious allegation Mr. Bevan would have inquiries made. In the absence of such information Mr. Bevan said he could only ask the country to take no notice of such irresponsible statements.

Mr. NICHOLSON said that some people were allergic to penicillin and that the administration of it did them harm. He asked whether any steps were being taken to see that doctors did not administer it when the patient told them that he was allergic to it.

Mr. BEVAN said that this was entirely a clinical matter with which he did not propose to interfere.

State Grants for Medical Students—On November 17 Mr. HASTINGS asked how many medical students were in receipt of scholarships and maintenance grants provided by the State and local authorities respectively, in England and Wales now and in 1938. Mr. TOMLINSON replied that 3,071 awards by his department to medical students were current, of which 2,634 were under the "Further Education and Training Scheme." The comparable figure for 1938 was 29, all of which were State scholarships. He was unable to state how many of the awards by local education authorities were for medical students.

Chloromycetin.—On December 1 Mr. ROLAND ROBINSON asked why chloromycetin was no longer available to patients under the National Health Service in cases where it was prescribed by their doctors. Mr. BLENKINSOP explained that, to ensure that this scarce and expensive drug was used to the best advantage, Mr. Bevan had arranged to purchase all available supplies and to distribute them through regional hospital board centres. The boards had discretion to make supplies available through the distribution centres to practitioners in domiciliary practice in exceptional cases.

Leprosy.—Mr. TOUCHE on December 1 asked how long the St. Giles Home near Chelmsford had been used for the treatment of lepers, and whether during that period any cases had arisen of this disease being contracted by people in the neighbourhood. Mr. BLENKINSOP replied that the home had been used for 35 years and that no cases of local infection with leprosy were known.

Hearing-aids.—Dr. BROUGHTON asked on December 1 how many Medresco aids had been issued. Mr. BLENKINSOP replied that, to November 5, 39,159 patients in England and Wales had been supplied with Medresco aids. The current average rate of issue was 1,015 a week. Waiting-lists totalled about 86,000. He added that Mr. Bevan was arranging for the staffs of the distribution centres to be increased and new centres to be opened as soon as possible.

Morphine for Mountaineers.—Mr. EDE told Mr. MARPLES on December 1 that representatives of mountaineering interests were invited some time ago to discuss with officers of the Home Office and of the Health Departments how suitable arrangements might be made for the administration of morphine to injured climbers. Mr. Ede hoped that a meeting would be arranged in the following week. He promised to announce his decision as soon as possible after this meeting.

School Dentists.—Mr. TOMLINSON stated on December 1 that for a complete service of dental inspection and treatment it is estimated that a ratio of about one dentist to 3,000 children would probably be required. In January, 1949, the number of school dentists employed by local authorities was equivalent to 868 whole-time officers. To give a ratio of one dentist to 3,000 children, an additional 975 would then have been required. Since then, there were indications that the number had seriously decreased.

Tuberculosis.—Sir ERNEST GRAHAM-LITTLE asked Mr. Bevan whether he was aware that, out of all the patients diagnosed during any one year as suffering from pulmonary tuberculosis, approximately 70% received institutional treatment in public sanatoria, and some 60% would have died from tuberculosis during the following five years. On December 1 Mr. BEVAN replied that he was not sure that an up-to-date long-term follow-up of patients would bear out Sir Ernest's figures. In any case the best hope of making curative treatment more effective lay in detecting the disease in its earliest stages. This was being increasingly achieved through mass radiography and supervision of contacts.

Tuberculosis Beds.—Answering Sir ERNEST GRAHAM-LITTLE on December 1, Mr. BEVAN reported that about 4,400 beds in sanatoria and tuberculosis hospitals were unoccupied on December 1 for lack of staff. Nursing staff in these institutions increased in the year ended June 30 by 774 full-time and 319 part-time, and in the same period 652 beds were reopened.

Hearing and Speech Defects.—The numbers of children suffering from hearing defects and speech defects noted at school medical inspections during 1948 were approximately 19,000 and 20,000 respectively. Ancillary part-time instruction in speech and lip-reading is desirable for some of these children and is provided by some local education authorities.

Epileptics.—The number of persons in epileptic colonies in England and Wales at the end of October, 1949, was 2,604.

Universities and Colleges

UNIVERSITY OF OXFORD

In a Congregation held on November 19 the degree of D.M. was conferred on W. B. Matthews (in absence).

UNIVERSITY OF CAMBRIDGE

In a Congregation held on November 26 the degree of M.D. was conferred on P. Hugh-Jones.

UNIVERSITY OF DUBLIN

SCHOOL OF PHYSIC, TRINITY COLLEGE

The following candidates have been approved at the examinations indicated:

M.D.—P. B. B. Gatenby, W. Houston.

M.B.—*B. A. McC. Thompson, *E. G. England, *Gwendoline G. L. Pools, W. D. H. Powell, Mildred Vilensky, E. V. Page, D. Miller, Marisa A. O'Keeffe, J. H. Ashmore, Margaret B. E. Ellis, F. H. Moore.

B.CH.—L. J. Clein, O. H Killen, Evelyn Browne, J. H. Ashmore, Ruth M. Perrott, Joan I. Buchanan, F. A. Walkey, E. G. England, R. C. Gray, Vyvyan I. K. Johnston, E. B. McHugh, R. ff. Jackson, T. T. E. Michael, B. J. O'Reilly, E. V. Page, Sheilagh M. McHugh, Margaret B. E. Ellis, W. A. McGaw, R. N. Siberry, W. D. McNaul.

*With second-class honours.

UNIVERSITY OF LONDON

The University Court has re-elected Sir Henry Dale, O.M., F.R.S., as Deputy Chairman for 1949–50.

The following have been appointed or nominated for appointment or reappointed as representatives of the University on the governing bodies indicated in parentheses: Professor W. C. W. Nixon (Council of the Training College for Midwife Teachers); Dr. G. H. Newns (Hospital for Sick Children); Dr. A. Hope Gosse (Hospitals for Diseases of the Chest); Dr. J. C. Hawksley (University College Hospital).

Joseph Rotblat, D.Ph., has been appointed to the Chair of Physics tenable at St. Bartholomew's Hospital Medical College, from January 1, 1950.

The following have been recognized as teachers of the University in the subjects indicated in parentheses: *Guy's Hospital Medical School:* Dr. T. A. B. Harris, Dr. W. S. McConnell, and Dr. E. H. Rink (Anaesthetics); Dr. T. H. Hills (Radiology); Dr. R. Kauntze (Medicine); Mr. R. S. Lawrie (Surgery); Mr. T. L. T. Lewis (Obstetrics and Gynaecology); Dr. R. C. MacKeith (Children's Diseases); Mr. J. W. Mansie, M.R.C.S., L.R.C.P., F.D.S. (Dental Surgery); Dr. T. A. Munro (Mental Diseases). *King's College Hospital Medical School:* Dr. F. S. Cooksey (Physical Medicine). *St. Bartholomew's Hospital Medical College:* Dr. G. J. Cunningham (Pathology (Morbid Anatomy and Histology)). *St. George's Hospital Medical School:* Mr. H. F. Anderson (Surgery); Dr. D. C. Shields (Physical Medicine). *St. Thomas's Hospital Medical School:* Dr. H. J. Wallace (Dermatology); Dr. W. D. Wylie (Anaesthetics). *London School of Hygiene and Tropical Medicine:* Dr. J. A. Fraser Roberts (Hygiene and Public Health (Medical Genetics)); Dr. R. F. Tredre (Hygiene and Public Health (Tropical Hygiene)). *University College:* Dr. J. Joseph (probationary recognition for two years from July, 1949) (Anatomy).

The Sanderson-Wells (Senior) Prize, of the value of £20, has been awarded to Dr. S. S. B. Gilder for his essay on "The Symptoms and Signs of Experimentally Induced Vitamin Deficiencies in Man," and the Sanderson-Wells (Junior) Prize, of the value of £10, has been awarded to D. F. Hawkins (University College) for his essay on "The Relation of Dietary Factors to Man's Performance of Muscular Work."

University Studentships in Physiology and in Anatomy have been awarded to R. J. Shephard (Guy's Hospital Medical School) and J. I. S. Robertson (St. Mary's Hospital Medical School) respectively.

Applications are invited from members of the University for grants from the Central Research Fund to assist specific projects of research and for the provision of special materials and apparatus. Applications, which will be considered three times a year, must be submitted by March 31, July 31, and November 30. Forms of application and further particulars may be obtained from the Academic Registrar, Senate House, London, W.C.1.

UNIVERSITY OF MANCHESTER

The Queen has graciously consented to visit the University on the occasion of the centenary celebration of the foundation of Owens College in May, 1951. Her Majesty will on that occasion be presented for an honorary degree. The date of the ceremony has not yet been agreed.

ROYAL COLLEGE OF SURGEONS OF ENGLAND

A series of lectures on otolaryngology, arranged jointly by the Royal College of Surgeons of England and the Institute of Laryngology and Otology, began at the College (Lincoln's Inn Fields, London, W.C.) on December 1, when Professor Geoffrey Jefferson discussed intracranial abscess. The remaining lectures will be delivered on the first Thursday in January, February, March, May, and July, 1950, at 5 p.m., and are open, without fee, to Fellows and Members and Fellows and Licentiates in Dental Surgery of the College. Details will be printed in the "Societies and Lectures" column of the *Journal* for the appropriate weeks.

ROYAL FACULTY OF PHYSICIANS AND SURGEONS OF GLASGOW

Dr. C. H. Andrewes, F.R.S., will deliver the Dr. John Burns Lecture in the Hall of the Faculty (242, St. Vincent Street, Glasgow), on Wednesday, December 14, at 5 p.m. His subject is "The Common Cold." Medical practitioners are invited to attend.

ROYAL COLLEGE OF SURGEONS IN IRELAND

The following were admitted to the Fellowship of the College on December 2: W. G. Fegan, J. H. Johnston, W. R. Lamb.

INFECTIOUS DISEASES AND VITAL STATISTICS

We print below a summary of Infectious Diseases and Vital Statistics in the British Isles during the week ended November 19. [No. 46

Figures of Principal Notifiable Diseases for the week and those for the corresponding week last year, for: (a) England and Wales (London included). (b) London (administrative county). (c) Scotland. (d) Eire. (e) Northern Ireland.

Figures of Births and Deaths, and of Deaths recorded under each infectious disease, are for: (a) The 126 great towns in England and Wales (including London). (b) London (administrative county). (c) The 16 principal towns in Scotland. (d) The 13 principal towns in Eire. (e) The 10 principal towns in Northern Ireland.

A dash — denotes no cases; a blank space denotes disease not notifiable or no return available.

Disease	1949					1948 (Corresponding Week)				
	(a)	(b)	(c)	(d)	(e)	(a)	(b)	(c)	(d)	(e)
Cerebrospinal fever	22	4	13	2	1	32	2	14	—	—
Deaths		1	—				—	—		
Diphtheria	96	12	32	3	6	154	14	58	11	3
Deaths	—	—	—	—	—	—	—	—	—	—
Dysentery	116	10	79	2	—	49	10	49	1	—
Deaths				—	—				—	—
Encephalitis lethargica, acute	—	—	—		—	—	—	—	—	—
Deaths		—					—			
Erysipelas			34	6	6			42	5	4
Deaths		—					—			
Infective enteritis or diarrhoea under 2 years				47					37	
Deaths	21	1	4	6	1	22	2	9	4	—
Measles*	1,301	23	33	51	76	6,923	135	153	69	54
Deaths†			—	2	—			1	—	—
Ophthalmia neonatorum	37	2	6		2	36	3	7	—	1
Deaths										
Paratyphoid fever	6	—	1(A)	2(B)	2	4	—	8(B)	—	—
Deaths		—	—		—	—	—	—	—	—
Pneumonia, influenzal	667	52	13	2	3	732	52	1	3	5
Deaths (from influenza)‡	19	2	3	—	—	15	3	2	1	—
Pneumonia, primary	268	59	216	32	11	249	46	225	23	7
Deaths				19					7	
Polio-encephalitis, acute	7	—				6	—			
Deaths										
Poliomyelitis, acute	219	29	5	4	—	46	4	5	3	1
Deaths§	13	1				3	1			
Puerperal fever			12		—			2		—
Deaths										
Puerperal pyrexia‖	112	12	6		1	100	9	8	1	1
Deaths		—					—			
Relapsing fever	—	—			—	—	—			—
Deaths										
Scarlet fever	2,563	186	269	161	276	1,835	117	325	174	41
Deaths†			—	—	—			—	—	—
Smallpox	—	—	—		—	—	—	—	—	—
Deaths					—				—	—
Typhoid fever	21	—	—	1	—	9	2	1	4	1
Deaths	1	—	—	—	—	—	—	—	—	—
Typhus fever	—	—	—	—	—	—	—	—	—	—
Deaths				—	—				—	—
Whooping-cough*	991	35	43	29	61	2,680	168	110	68	8
Deaths	2	—	—	—	—	3	—	—	—	—
Deaths (0–1 year)	239	33	44	24	7	323	47	43	18	7
Deaths (excluding stillbirths)	5,399	937	621	211	113	5,063	846	647	168	117
Annual death rate (per 1,000 persons living)			12·5	13·1				13·1	10·5	
Live births	6,804	1050	831	305	220	7,148	1107	880	346	237
Annual rate per 1,000 persons living			16·7	18·9				17·8	22·8	
Stillbirths	158	25	18			222	27	29		
Rate per 1,000 total births (including stillborn)			21					32		

* Measles and whooping-cough are not notifiable in Scotland, and the returns are therefore an approximation only.

† Deaths from measles and scarlet fever for England and Wales, London (administrative county), will no longer be published.

‡ Includes primary form for England and Wales, London (administrative county), and Northern Ireland.

§ The number of deaths from poliomyelitis and polio-encephalitis for England and Wales, London (administrative county), are combined.

‖ Includes puerperal fever for England and Wales and Eire.

EPIDEMIOLOGICAL NOTES

Poliomyelitis

Notifications in the week ended November 26 were: poliomyelitis 176 (219), polio-encephalitis 17 (7). Figures for the previous week are shown in parentheses. The number of notifications of poliomyelitis and polio-encephalitis together is now a little higher than it was in the corresponding week of 1947—193 against 145. An extension of relatively high prevalence into the winter months has been reported from other countries of recent years, and when the next review of the world situation is published by WHO it will be interesting to see how far this trend is a general one.

Multiple cases were reported in the following counties: London 24 (29), Berks 3 (5), Buckingham 5 (3), Chester 6 (0), Derby 2 (1), Devon 2 (1), Dorset 3 (1), Durham 2 (2), Essex 16 (14), Gloucester 8 (8), Hereford 2 (1), Hertford 6 (4), Kent 14 (20), Lancaster 10 (10), Leicester 7 (3), Middlesex 11 (15), Norfolk 12 (3), Nottingham 5 (4), Southampton 4 (3), Stafford 3 (2), East Suffolk 3 (2), Surrey 6 (6), East Sussex 3 (4), Warwick 7 (13), West Yorks 17 (32), Glamorgan 5 (10).

Contacts Travelling to and from Eire

When a person who is under surveillance because he is suspected of having been in contact, either abroad or in this country, with a case of smallpox, cholera, typhus fever, plague, or yellow fever intends to travel to the Irish Republic, the medical officer of health who is responsible for the surveillance should send a notification direct to the Department of Health, Custom House, Dublin. If it is necessary to send a notification by telegram it should be addressed to "Health Dublin."

When a person who is under similar surveillance in the Irish Republic intends to travel to this country, the city or county medical officer of health who is responsible for the surveillance there will send, or if necessary telegraph, such a notification to the Ministry of Health (Division 5C), Whitehall, London, S.W.1. The Ministry will notify the medical officer of health for the district to which the person is travelling. For the time being these arrangements are restricted to the five diseases named—those to which the International Sanitary Conventions apply—but the possibility of extending them later to other infectious diseases is not excluded.

Discussion of Table

In *England and Wales* infectious diseases were more prevalent than during the previous week. Increases in the number of notifications included: scarlet fever 400, measles 246, acute pneumonia 133, dysentery 24, whooping-cough 14, and diphtheria 11. The only exceptions to the general rise were acute poliomyelitis and acute polio-encephalitis with decreases of 74 and 16 respectively.

The incidence of scarlet fever is now at its highest level for six years. During the week additional cases were reported from every region except Yorkshire; the largest local rises were Lancashire 100, Derbyshire 40, Warwickshire 35, and Middlesex 34. The incidence of measles declined slightly in the southern section of the country and rose in the northern, though it was only in a few counties that a large rise occurred. In the combined areas of London, south-east, south-west, and south-midland counties the notifications of measles were 76 fewer than in the preceding week, while the largest increases were Durham 147, Norfolk 127, and Staffordshire 45. The chief feature of the returns of diphtheria was a rise of 6 in the notifications in Lancashire. The local fluctuations in the trends of whooping-cough were small; the largest was a decline in notifications of 31 in Lancashire. A small rise in the notifications of acute pneumonia was fairly general throughout the country; the largest increases were London 34 and Yorkshire West Riding 27.

Of the 27 cases of typhoid, 10 were notified in Lancashire. The largest centres of dysentery were Lancashire with 29 notifications (Liverpool C.B. 12), Glamorganshire (Cardiff C.B. 17), and London 10. The largest reported outbreaks of food-poisoning were Dorset, Sherborne U.D., with 39 cases and Yorkshire West Riding, Batley M.B., with 29.

In *Scotland* increases were recorded in the notifications of acute primary pneumonia 43, scarlet fever 16, and diphtheria 9, while a decrease of 12 was reported for whooping-cough. The rise in diphtheria was contributed by Glasgow, where the cases rose from 12 to 26. Of the 79 cases of dysentery 54 were notified in Glasgow.

In *Eire* falls occurred in the number of notifications of measles 29 and diarrhoea and enteritis 8, and a rise of 13 was recorded for scarlet fever.

In *Northern Ireland* rises occurred in the number of notifications of scarlet fever 83, whooping-cough 22, and measles 18. The rise in these three diseases was due to an increased prevalence in Belfast C.B.

Week Ending November 26

The notifications of infectious diseases in England and Wales during the week included: scarlet fever 2,827, whooping-cough 1,035, diphtheria 121, measles 1,469, acute pneumonia 710, cerebrospinal fever 32, acute poliomyelitis 176, acute polioencephalitis 17, dysentery 144, paratyphoid fever 11, typhoid fever 11, food-poisoning 128.

Medical News

Nuffield Grants for Cortisone Research

The Nuffield Foundation has made a grant to Oxford University of £10,000 payable over three years for research on the synthesis of cortisone, and the following grants, also payable over three years, to Cambridge University: (1) £5,000 for research in the Chemical Laboratory under Professor A. R. Todd, F.R.S., on the convenient synthesis of peptides and their application in particular to problems of the adrenocorticotropic hormone, and for work on the synthesis of compounds with cortisone activity but simplified structure; (2) up to £11,000 for research in the School of Biochemistry under Professor F. G. Young, F.R.S., on pituitary adrenocorticotropic hormones.

Royal Society Elections

At the 287th anniversary meeting of the Royal Society, held on November 30, the following were elected as officers and council for the ensuing year. *President:* Sir Robert Robinson, O.M. *Treasurer:* Sir Thomas Merton. *Secretaries:* Sir Edward Salisbury and Sir David Brunt. *Foreign Secretary:* Professor E. D. Adrian, O.M. Sixteen members of council were elected, including the following medical men: Professor G. L. Brown, Dr. F. M. R. Walshe, Dr. V. B. Wigglesworth, and Professor S. Zuckerman.

World Health Organization Fellowships

The World Health Organization, in order to strengthen health services throughout the world, provides fellowships to medical practitioners who are engaged, or will be engaged, in public health services, medical education, or medical research. The amount of the fellowships varies from 200 to 300 dollars a month, plus cost of travel, tuition fees, books, and literature. The fellowships are open to members of the medical profession who have gained at least two years' experience in the field in which they will study under the fellowships scheme. In special circumstances consideration will be given to undergraduates and to non-national graduates employed by the governments of countries not possessing their own graduates suitable for fellowships, provided that such fellows agree to return at the end of their period of study in order to serve the country whose government sponsored their fellowship. Full details of the fellowships can be obtained from the General Secretary, United Nations Organization, Palais des Nations, Geneva.

Sheriff

Mr. E. Davies-Thomas, of Edgbaston, Birmingham, has been nominated a sheriff for Cardiganshire for 1949.

Dr. Morris Fishbein

According to *Time* of December 5, Dr. Morris Fishbein has now resigned from the editorship of the *Journal of the American Medical Association*. He has been editor since 1924.

No Health Centre for Festival

Early in the year the London County Council decided to erect a comprehensive health centre on a site in East India Dock Road, Poplar, in an area to be used for the purposes of the Festival of Britain, 1951. It was intended to give visitors to the Festival some idea of the architecture and facilities of such a unit. But the Minister of Health has been unable in present circumstances to approve of such a centre, though he has intimated that he would be prepared to approve a new building of relatively small extent to accommodate a group practice. The Health Committee of the County Council considers that a group-practice building could only be in the nature of an improvised transitional type of health centre, and as such would be hardly worthy of inclusion in the exhibition. Moreover, the erection of a group-practice building might prejudice the use of the site for a comprehensive health centre later on, and the purpose of closely associating the private practitioner with the other personal health services in the area would not be achieved. The Minister's suggestion will not therefore be adopted. The site is to be reserved until the economic situation has improved and further experience has been gained in the operation of health centres and group practice on a small scale.

Changes in Nurses' Examinations

The General Nursing Council for England and Wales has decided to make certain changes in its Preliminary and Final examinations held in June, 1950, and subsequently. The time allotted to the practical and oral examinations in nursing will be increased, and the oral examinations in anatomy and physiology, hygiene, medicine, and surgery will be discontinued. A section on "Introduction to Psychology" will be included in Part 2 of the Preliminary examination syllabus, and there will be optional questions on psychology in the papers for Part 2 of the Preliminary examination in June, 1950, and thereafter. Candidates for Part 2 of the Preliminary examination in October, 1951, and subsequently must have been instructed in the section on "Introduction to Psychology." The introductory instruction on psychology should teach the student to understand behaviour as it is affected and modified by changes in the environment and the body, by family and community influences, education, and so on. The council does not consider it desirable that instruction should be given on the investigation and diagnosis of abnormal conditions or on psychological methods of treatment.

Wills

Professor Stevenson Lyle Cummins, formerly of the Welsh National School of Medicine, left £8,804. Dr. Arthur Carveth Johnson, of Newport, left £13,697; Surgeon Rear-Admiral William Wallace Keir, of Bishop's Waltham, Hants, £3,676; Dr. Brian Rait-Smith, of St. Albans, Herts, £3,526; and Dr. Richard Aloysius Quinn, of Wigton, Cumberland, £2,820.

COMING EVENTS

Heberden Society

The annual general meeting of the Heberden Society will be held at the Royal College of Surgeons of England, Lincoln's Inn Fields, London, W.C., to-day and to-morrow (Friday and Saturday, December 9 and 10). On December 9, at 5 p.m., the annual general meeting will be followed by the Heberden Oration on "Classical Gout" by Professor F. Wood Jones, F.R.S., and at 8 p.m. the annual dinner will be held. On December 10, at 10.30 a.m., at St. Thomas's Hospital (Anatomy Lecture Theatre), London, S.E., Professor D. V. Davies will open a discussion on "Anatomical Aspects of the Rheumatic Diseases," and at 11.45 a.m. the discussion will be continued by Dr. W. A. Fell.

National Society for the Prevention of Blindness

The next annual conference of the National Society for the Prevention of Blindness will be a combined meeting with the Pan-American Association of Ophthalmology, to be held on March 26 to 30, 1950, at the Hotel Floridian, Miami Beach, Florida. Among the topics to be discussed at the conference are current blindness prevention programmes in the countries of the Western Hemisphere; trachoma; industrial ophthalmology; eye problems of school-children; and medical and social management of the glaucomas.

American Tuberculosis Meeting

The 46th annual meeting of the American National Tuberculosis Association will be held on April 24–28, 1950, at the Hotel Statler, Washington, D.C. The medical section of the association—the American Trudeau Society—and the National Conference of Tuberculosis Secretaries, an organization of public health workers, will meet at the same time. The medical sessions will be on the following subjects: the chemotherapy of tuberculosis, surgical aspects of tuberculosis, laboratory investigations, and non-tuberculous diseases of the chest. Further information may be obtained from the National Tuberculosis Association, 1790, Broadway, New York, 19, N.Y., U.S.A.

SOCIETIES AND LECTURES

Monday

INSTITUTE OF LARYNGOLOGY AND OTOLOGY, 330-332, Gray's Inn Road, London, W.C.—December 12, 5.30 p.m., "*The Mechanism of Vestibular Reactions*," by Professor Gösta Dohlman (University of Lund, Sweden).

MEDICAL SOCIETY OF LONDON, 11, Chandos Street, Cavendish Square, London, W.—December 12, 8.30 p.m., discussion: "*Bone Tumours*," to be introduced by Drs. J. F. Brailsford and H. A. Sisson.

Tuesday

CHELSEA CLINICAL SOCIETY.—At South Kensington Hotel, 47, Queens Gate Terrace, London, S.W., December 13, 7 for 7.30 p.m., discussion: "*Fashions and the Freudians*," to be opened by Mr. James Laver.

INSTITUTE OF DERMATOLOGY, 5, Lisle Street, Leicester Square, London, W.C.—December 13, 5 p.m., "*Scleroderma*," by Dr. G. B. Dowling.

INSTITUTE OF PHYSICS: ELECTRONICS GROUP.—At 47, Belgrave Square, London, S.W., December 13, 5.30 p.m., "*The Nervous System as an Electrical Machine*," by Dr. W. Grey Walter.

Wednesday

CAMBRIDGE UNIVERSITY.—At Addenbrooke's Hospital, Cambridge, December 14, 2.30 p.m., "*The Ethics of Medical Practice*," by Dr. B. Branford Morgan.

INSTITUTE OF DERMATOLOGY, 5, Lisle Street, Leicester Square, London, W.C.—December 14, 5 p.m., "*X-ray Technique*," by Dr. C. W. McKenny.

LONDON ASSOCIATION OF THE MEDICAL WOMEN'S FEDERATION.—At B.M.A. House, Tavistock Square, London, W.C., December 14, 8.30 p.m., "*Diseases of the Newborn, Recent Advances in Treatment*," by Dr. Victoria Smallpeice.

MIDDLESEX COUNTY MEDICAL SOCIETY.—At Ashford Hospital, London Road, Ashford, December 14, 3 p.m., general meeting. "*Some Endemic Diseases of Egypt*," by Dr. E. N. Callum.

ROYAL FACULTY OF PHYSICIANS AND SURGEONS OF GLASGOW, 242, St. Vincent Street, Glasgow.—December 14, 5 p.m., "*The Common Cold*," by Dr. C. H. Andrewes.

ROYAL SANITARY INSTITUTE, 90, Buckingham Palace Road, London, S.W.—December 14, 2.30 p.m., "*Tuberculosis Infection and the Use of B.C.G.*," discussion to be opened by Dr. Frederick Heaf.

SOCIAL PSYCHOTHERAPY CENTRE, 7, Fellows Road, London, N.W.—December 14, 5 p.m., "*Social Psychiatry*," general discussion by Dr. Joshua Bierer and other members of the staff of the centre.

SOCIETY OF CHEMICAL INDUSTRY: FOOD GROUP.—At Burlington House, Piccadilly, London, W., December 14, 6.15 p.m., meeting of Nutrition Panel. "*Soups as Food*," papers by Messrs. H. S. Sarson and J. G. Huntley, and Miss B. R. Stanton. Visitors are invited.

Thursday

BRITISH INSTITUTE OF RADIOLOGY.—At 32, Welbeck Street, London, W., December 15, 8.15 p.m., Joint meeting with Radiological Section, Royal Society of Medicine, "*The Physical Properties and Performance of Fluorescent Materials and Amplification of the Intensity of the Fluorescent Image*," papers by Messrs. J. W. Mitchell, M.Sc., and G. N. Harding, B.Sc.

EDINBURGH CLINICAL CLUB.—At B.M.A. Rooms, 7, Drumsheugh Gardens, Edinburgh, December 15, 8 p.m., "*Varicose Veins and Thrombophlebitis of the Leg*," by Mr. T. McW. Millar.

ST. GEORGE'S HOSPITAL MEDICAL SCHOOL, Hyde Park Corner, London, S.W.—December 15, 4.30 p.m., lecture-demonstration: "*Neurology*," by Dr. D. J. Williams.

Friday

BIOCHEMICAL SOCIETY.—At Guy's Hospital Medical School (Department of Biochemistry and Chemistry), London Bridge, S.E., December 16, 2 p.m., communications and demonstrations.

BRITISH INSTITUTE OF RADIOLOGY.—At 32, Welbeck Street, London, W., December 16, 5 p.m., meeting of Medical Members.

BRITISH INSTITUTE OF RADIOLOGY.—At Royal Society of Medicine, 1, Wimpole Street, London, W., December 16, 8.15 p.m., Joint meeting with Radiological Section, Royal Society of Medicine. "*The Physical Properties and Performance of Fluorescent Materials and Amplification of the Intensity of the Fluorescent Image*," paper by Mr. F. I. G. Rawlins, M.Sc.

FACULTY OF RADIOLOGISTS.—At Royal College of Surgeons of England, Lincoln's Inn Fields, London, W.C., December 16, 2.15 p.m., "*The Chest After Thoracic Operation*," speakers Mr. P. R. Allison and Professor A. S. Johnstone.

MAIDA VALE HOSPITAL FOR NERVOUS DISEASES MEDICAL SCHOOL, Maida Vale, London, W.—December 16, 5 p.m., clinical demonstration by Dr. J. W. D. Bull.

Saturday

YORK MEDICAL SOCIETY.—At 17, Stonegate, York, December 17, 8.30 p.m., "*Disorders of Micturition*," by Mr. J. K. Willson Pepper.

APPOINTMENTS

HOCKEN, M. E., M.B., Ch.B., D.P.H., County Medical Officer and School Medical Officer, Isle of Ely County Council.

JACKSON, MALDWYN ISAAC, M.R.C.S., L.R.C.P., Consultant Chest Physician, Newport and East Monmouthshire Group, Welsh Regional Hospital Board.

JOHNSTON, WILLIAM, M.B., Ch.B., Medical Officer, Royal Western Counties Institution, Starcross, Devon, South-Western Regional Hospital Board.

MAXWELL, J. A., C.V.O., C.B.E., M.B., B.Ch., F.R.C.S.Ed., Surgeon Rear-Admiral, R.N.(ret.), Medical Superintendent, St. Mary's Hospital, Portsmouth.

PERRY, WILLIAM RODHAM, M.B., B.S., D.P.H., Medical Officer of Health to Basford Rural District Council and Eastwood Urban District Council, and Assistant County Medical Officer, Nottinghamshire.

SCOTT, GORDON ISLAY, M.B., Ch.B., F.R.C.S.Ed., Consultant Surgeon, Moray Hospitals.

WALKER, JOSEPH, M.B., Ch.B., L.D.S., D.P.H., D.P.D., Divisional Medical Officer, Health Division 4, Lancashire County Council.

BIRTHS, MARRIAGES, AND DEATHS

BIRTHS

Cader.—On November 30, 1949, to Joan (née Thornborrow), B.D.S., wife of Marzook A. Cader, M.R.C.S., L.R.C.P., M.B., B.S., D.L.O., a son.

Lucas.—On November 30, 1949, at Strathlean Nursing Home, Muswell Hill, to Kathleen, wife of David R. Lucas, M.B., B.S., a daughter—Jacqueline Frances.

Scudamore.—On November 24, 1949, at Stapleford, Notts, to Mary Ruth (née Jones), wife of Dr. T. O. Scudamore, M.B., D.R.C.O.G., a daughter.

DEATHS

Anderson.—On November 29, 1949, William Anderson, O.B.E., M.B., F.R.C.S., of 28, Carnegie Crescent, Aberdeen.

Cairns.—On November 28, 1949, at 60, Seabank Road, Wallasey, William Murray Cairns, C.B.E., M.D., previously of 67, Catharine Street, and Parkfield Road, Liverpool, aged 83.

Cameron.—On November 25, 1949, at Midhurst Sanatorium, Robert Cameron, M.D., of 19, Fulbrooke Road, Cambridge.

Gordon-Munn.—On November 29, 1949, at Croys, Castle Douglas, Scotland, John Gordon Gordon-Munn, M.D., F.R.S.Ed., J.P., aged 86.

Grimshaw.—On October 11, 1949, at 2, Holly Bank Road, Clifton Park, Birkenhead, John Grimshaw, M.D., D.P.H., aged 82.

Humphrey.—On December 1, 1949, Leslie Alfred Humphrey, M.R.C.P., M.R.C.S., aged 32.

Hutchinson.—On November 24, 1949, at 20, Ramshill Road, Scarborough, Robert Hutchinson, M.B., Ch.B.Ed.

Huxtable.—On November 23, 1949, Arthur Edwin Huxtable, M.R.C.S., of The Vicarage, Houghton Regis, Beds, aged 94.

King.—On November 21, 1949, at Southampton, Arthur King, M.D., aged 87.

McKiernan.—On November 21, 1949, at Falmouth, Thomas Hugh Robinson McKiernan, M.B., B.Ch., B.A.O.

Mahood.—On November 23, 1949, Allan Edward Mahood, M.B., F.R.C.S., of Haynford, Norwich, aged 86.

Nuttall.—On November 30, 1949, at Southern Hay, Llanerch Road West, Colwyn Bay, Denbigh, Harold Nuttall, M.D., aged 78.

Orr.—On November 28, 1949, at Edinburgh, John Orr, M.D., F.R.C.P.Ed., of 6, Strathearn Road, Edinburgh.

Parry.—On November 19, 1949, at Caernarvon, William Hilton Parry, *M.C.*, M.B., Ch.B., J.P.

Reeve-Flaxman.—On November 20, 1949, at Middlesex Hospital, London, W., Samuel Christopher Reeve-Flaxman, M.R.C.S., L.R.C.P., aged 69.

Sanders.—On November 20, 1949, at Gleniffer, Four Oaks, Warwickshire, Arthur Addison Sanders, O.B.E., M.B., Ch.B., Surgeon Captain R.N., retired.

Smith.—On November 30, 1949, at Springfield, Hawkhurst, Kent, Herbert Austen Smith, C.I.E., M.B., B.Ch., M.R.C.S., L.R.C.P., Colonel I.M.S., Ret., aged 83.

Smith.—On November 29, 1949, at Pembury Hospital, John Smith, M.B., Ch.B., of Sutton Valence, Maidstone, Kent, aged 48.

Storey.—On November 24 1949, on way home from Singapore, Bryan Hamilton Storey, M.R.C.S., L.R.C.P., Colonial Medical Service, aged 27.

Stork.—On November 27, 1949, after a short illness, Ernest Stork, D.S.O., M.B., J.P., of Bury St. Edmunds, aged 79.

Sullivan.—On November 23, 1949, at The Elms, South Kirkby, near Pontefract, Edward James Holmes Sullivan, M.D., aged 90.

Trethowan.—On December 1, 1949, at Stoke-on-Trent, Joan Durham Trethowan, M.R.C.S., L.R.C.P.

Wilson.—On November 28, 1949, at The Lindo Wing, St. Mary's Hospital, London, W., Anna Justina Augusta Wilson, F.R.C.P.Ed., late of 11, Wimpole Street, London, W.

Wyatt.—On November 24, 1949, at Guy's Hospital, Harold Douglas Wyatt, M.R.C.S., L.R.C.P., of the Ministry of Pensions.

Any Questions?

Correspondents should give their names and addresses (not for publication) and include all relevant details in their questions, which should be typed. We publish here a selection of those questions and answers which seem to be of general interest.

Vasomotor Rhinitis

Q.—*(1) What is the modern opinion regarding the value of skin tests in a case of vasomotor rhinitis? (2) What hope is there of obtaining relief for this distressing complaint by desensitization? (3) Is cauterization of the nose of any value in treatment? The patient in question has a family history of allergy, and x-ray examination of the sinuses reveals a mucous polypus on the floor of the right antrum. (4) Could this polypus cause the symptoms, and what should be done about it?*

A.—(1) Allergy to foods and inhalants undoubtedly is the cause of some cases of vasomotor rhinitis, especially where there is a family history of allergic conditions. In this group inhalants account for the large majority and foods are relatively unimportant. Apart from pollens, which are seasonal, house dust is by far the commonest cause. In these cases morning sneezing is very common and a history of itching or irritation of the nose and nasopharynx is often obtained. The nasal smear in these cases contains eosinophil leucocytes but no pus. In such cases intracutaneous skin tests are helpful and must be done. But when skin tests are carried out by inexperienced persons as a short cut to the diagnosis and as the sole method of investigation they are more often than not misleading. Although positive skin reactions may be obtained to more than one allergen, clinically one allergen is usually found to be dominant. This can, with special techniques, be confirmed immunologically.

(2) Eliminative procedures aimed at reducing contact with house dust to a minimum together with desensitization give satisfactory results in these cases. The difficulty arises owing to the frequent development of superadded infection and the natural tendency of these patients to become allergic to their infection. The finding of pus in the nasal smear is an indication of infection. The presence of a polypus suggests that this patient has had some superadded infection to which he is allergic.

(3) Cauterization of the septal tubercle and anterior end of the inferior turbinate will in many cases relieve the symptoms. It does not, of course, remove the cause, and should not be too often repeated, as it destroys some of the ciliated epithelium.

(4) The polypus probably does not contribute appreciably to the symptoms. Removal could be effected only by opening the antrum through the canine fossa, with a risk of introducing further infection—a most undesirable complication in allergy. Therefore it should be left, unless it is growing rapidly and possibly blocking the ostium.

Treatment of Alcoholism

Q.—*What is the rationale of the treatment of alcoholism by "antabuse"? Is there a risk to the patient in the use of this drug, and also afterwards if he should take alcohol? Is this the best method of treatment available or are there any other drugs which are as effective and as easy to administer?*

A.—"Antabuse" (tetraethylthiuramdisulphide) interferes in some unknown way with the normal metabolism of alcohol in the body, giving rise to unusually high concentrations of acetaldehyde in the blood after alcohol has been taken. This causes unpleasant symptoms, such as congestion of the face and eyes, tachycardia, palpitation, giddiness, headache, and anxiety, which are nearly always alarming to the patient and are occasionally severe enough to be dangerous. In consequence it is wise for this treatment, in its early stages at least, to be undertaken in an institution until the patient's reaction to a test dose of alcohol following antabuse has been properly established. Antabuse is innocuous unless alcohol is subsequently taken. There is as yet no other sensitizing agent to alcohol which is as effective and as easy to administer as antabuse, but the latter in itself is not a short-cut to the cure of alcoholic addiction; it is only a valuable ancillary to the psychological and environmental rehabilitation of the patient, without which the ultimate results of treatment are almost always unfavourable.

Progressive Muscular Atrophy

Q.—*Has there been any recent advance in the understanding of the aetiology, and also in the treatment, of progressive muscular atrophy? What is the prognosis?*

A.—Unfortunately there has been no recent advance in the understanding of the aetiology or in the treatment of progressive muscular atrophy. The course of the disease varies considerably in different individuals, and the age of the patient seems to be the most important factor in influencing the rate of deterioration. When the disease begins in the early thirties there is usually a rapid downhill course and death often occurs within two years. In the elderly, on the other hand, the prognosis is usually better and the patient may live five years or even longer. The site at which the motor neurone degeneration begins is also important, for when the bulbar muscles are affected early the prognosis is worse than when the disease first shows itself in the wasting of the small muscles of the hands.

Tuberculosis Mortality Rate

Q.—*The death rate from respiratory tuberculosis is now only a quarter of that of 100 years ago. It would be interesting to know how much of this decrease is due to better treatment as opposed to general public health measures. Are there any figures available to show to what extent the cure rate in diagnosed cases of pulmonary tuberculosis has improved under modern methods?*

A.—This is too large a question to be answered shortly: in fact, the complete answer is not known. A number of factors have influenced the decline in the mortality rate from tuberculosis, and authorities differ in their estimates of the relative importance of these. It seems probable that improved living standards following industrialization have had the greatest influence. There is abundant evidence that changes in living conditions—for example, in wartime—are accurately reflected in the tuberculosis mortality. The campaign against tuberculosis and improvements in treatment have undoubtedly played a part, but it is impossible to assess their effect accurately. Bentley ("Artificial Pneumothorax," *Spec. Rep. Ser. med. Res. Coun., Lond.*, 1936, 215) showed that the number of patients whose lives were prolonged by artificial pneumothorax treatment was so small when compared with the whole tuberculous population that the use of this treatment would not alter materially the gross survival rates. The same applies to most other methods of treatment, which, although invaluable to a small group, have little effect upon the whole. Statistics are available to show that, within their limited field, modern methods of treatment have improved the chance of survival. Simmonds and Martin (*Amer. Rev. Tuberc.*, 1948, **58**, 637) have demonstrated that the chance of survival is doubled by the use of collapse therapy in suitable cases, and the benefit to be derived from streptomycin in cases of tuberculous meningitis is even more obvious. For further discussion of the reasons for the general decline in the tuberculosis mortality rate the questioner is referred to Rich, *The Pathogenesis of Tuberculosis*, 1946, chapter 21, and Pinner, *Pulmonary Tuberculosis in the Adult*, 1945, chapter 19.

Testicular Grafts

Q.—*Is it possible to graft a testis in a case in which both testicles have been removed and, if so, is this likely to improve the general health?*

A.—Testicular grafts taken from other animals, and even from chimpanzees, are rapidly extruded by the host's body. Even when grafts are made from human testes removed because

they are misplaced, they are absorbed within a year. Fortunately there is no need to resort to grafting now that the male hormone has been discovered and synthesized. A patient can be prevented from becoming a eunuch by giving him injections of testosterone or by implanting pellets of this hormone. Under such treatment the signs of eunuchoidism disappear and sexual desire returns. Treated thus, a patient of the writer's has passed through the Divorce Courts as the guilty party and remarried. Sexual capacity has been maintained with weekly doses of 25 to 50 mg. of testosterone.

Oedema of Upper Eyelids

Q.—*Is there any treatment for persistent oedema of the upper eyelids? A boy aged 18 has suffered from this for more than four years—to such a degree that the pouches so formed hang over the ciliary margins. Renal function is normal, but skin tests show definite reaction to cow and dog hair. He had a severe tonsillitis when a child, but recent removal of the tonsils has not improved the condition. Salt-free diet, antihistamines, and specific and non-specific desensitization have had no effect.*

A.—Oedema of the upper eyelids may be secondary to inflammation, injury, systemic disturbance, or allergy. Sometimes blockage of the upper canaliculus causes oedema of the upper eyelids, but one would not expect it to persist for four years. It is unusual for allergic oedema to be confined to the upper eyelids. Since it is so persistent and constant in this case, one would tend to rule out inhalants and foods as causative factors and would search again for a focus of infection, such as teeth, sinuses, etc. Trichiniasis might be considered. The history would suggest that there is now a chronic lymphatic obstruction, and if a cause cannot be found the patient might be seen by a plastic surgeon.

Salmonella Typhi O Agglutinin Reaction

Q.—*Is it possible for a subject who had T.A.B. injections seven years ago, and none since, to give a serum agglutination of Salmonella typhi in high titre for "O" and less high for "H," unless he is actually infected now with Salm. typhi? When the test was repeated recently the reaction was found to be less strongly positive, but still above 1 in 100. I understand that an anamnestic Widal reaction shows an increase in H antigen but not in O where some other infection is concerned.*

A.—A positive reaction with *Salmonella typhi* O to a titre of more than 1 in 100 is strongly suggestive of an active enteric infection unless the patient has been inoculated with T.A.B. vaccine within the previous six months. The fact that in this case the O titre was higher than the H would not invalidate this general statement, although the inverse findings are more usual. It is true that the O agglutinins are not usually affected, as H agglutinins are, by non-specific stimuli (anamnestic reaction, such as a non-enteric infection), but if in this case there is no more definite laboratory evidence of infection, such as the isolation of *Salm. typhi* from blood or stools, a positive O agglutinin reaction cannot in itself be taken as proof of infection.

Post-encephalitic Parkinsonism

Q.—*As a child a man aged 40 had sleeping sickness, from which he recovered. He now complains of (a) upward rolling of the eyeballs with loss of vision, which returns after sleep; (b) a condition similar to paralysis agitans; and (c) a general slowing-up effect. What is the likely diagnosis, and what should be the treatment?*

A.—This patient is clearly suffering from post-encephalitic Parkinsonism and the attacks are oculogyral spasms, the latter being a manifestation of encephalitis lethargica, which was much commoner 20 years ago than it is now. The treatment is the usual treatment of Parkinsonism. In the past this has consisted in the administration of drugs of the belladonna group; of these, tincture of stramonium is the most effective. A suitable initial dose would be 10 minims (0.6 ml.) in water three times a day, and this could be gradually increased up to 30 minims (1.8 ml.) three times a day if the patient tolerates it well. Recently new substances have become available. The most effective of these seems to be "artane" (3-[1-piperidyl]-1-phenyl-1-*cyclo*hexyl-1-propanol hydrochloride), which is not yet procurable in this country but is being used in the United States. Next in value is "parpanit" (the diethylaminoethyl ester of phenyl*cyclo*pentane-carboxylic acid), the initial dose of which is 0.00625 g. If the patient tolerates it well, this can soon be doubled and then the dose more gradually increased up to the limit of tolerance. "Benadryl" is also worth a trial. Mental retardation and loss of energy often respond to amphetamine in 5-mg. doses.

Pruritus of Scrotum

Q.—*How should one treat pruritus of the scrotum, occurring mainly at night, in a man of 77 who has suffered from coronary disease for 12 years and still has occasional anginal attacks? There is no rash or sign of irritation. The itching is relieved by cocaine ointment, but each application has brought on an attack of dyspnoea and violent palpitation.*

A.—In pruritus of the scrotum in a man of this age it is important first to be certain that there is no irritation from a dribble of urine or from something in the urine, perhaps sugar occasionally or some other irritant. If any such factor is present and cannot be corrected, then some help may be obtained from the use of a waterproof barrier cream on the scrotum. The question of prostatic irritation may occasionally have some bearing in these cases, but in the absence of an organic or local cause the affection is not uncommonly neurogenic. Cocaine and similar analgesic ointments are not usually desirable and often give rise to trouble by causing irritation or sensitization. Crude tar in a paste or superficial *x*-ray therapy in fractional dosage, combined with phenobarbitone or "sodium amytal" at night, should be helpful.

NOTES AND COMMENTS

Carbachol for Migraine.—Mr. S. G. STEVENSON (joint assistant managing director of Messrs. Savory and Moore Ltd.) writes: In his letter concerning carbachol for migraine (November 19, p. 1177), Dr. J. H. Mellotte states that the German preparation "doryl" and the English one "moryl" are inferior to carbachol. I must point out that both "doryl" and "moryl" are proprietary names for carbachol B.P., and that there is no difference, chemically or pharmacologically, between them and the official preparation. Further, as is frequently the case, carbamylcholine chloride was available to the medical profession under these proprietary names before it was included in the B.P. as carbachol. Although "doryl" is no longer available, "moryl" is still the Savory and Moore branded name for carbachol B.P.

Correction.—Dr. EDGAR RENTOUL writes from the Forensic Medicine Department of Glasgow University: I regret that in the latter part of my article, "Rh Genotype Tests in a Trial under the Criminal Law Amendment Act, 1885," published in the medico-legal section of the *Journal* of December 3 (p. 1300), I was in error, when discussing the theoretical possibility of finding the true father, in stating that the true father must belong either to genotypes Cde/cde or Cde/Cde. While the true father may belong to one of these genotypes, this is not necessarily so. The real position is that the father must carry on one of his chromosomes Cde. There are several genotypes which satisfy this proviso in addition to those which I mentioned. The commonest of these is CDe/Cde; this occurs in 0.8016% of the population. The others are much less common. While, therefore, it might be more difficult to find the true father than I originally suggested, we still have in this case the theoretical possibility of being able to demonstrate paternity by blood grouping.

All communications with regard to editorial business should be addressed to THE EDITOR, BRITISH MEDICAL JOURNAL, B.M.A. HOUSE, TAVISTOCK SQUARE, LONDON, W.C.1. TELEPHONE: EUSTON 2111. TELEGRAMS: *Ainology, Westcent, London.* ORIGINAL ARTICLES AND LETTERS forwarded for publication are understood to be offered to the *British Medical Journal* alone unless the contrary be stated.

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